Part Two

Settings, Impacts, and Mitigation Measures

Part 2: Settings, Impacts, and Mitigation Measures

INTRODUCTION

This part contains the summary of existing environmental conditions (settings) and analysis of environmental impacts of the proposed Transportation 2030 Plan, as described in Chapter 1.2. This part is organized by issue area; and within each issue area, the environmental setting (both physical and regulatory settings) is described, significance criteria are established, and impact analysis is conducted. For each potentially significant impact, mitigation measures are identified. Please note that impacts of project alternatives are presented and compared in Chapter 3.1.

METHODOLOGY & ASSUMPTIONS

In order to assess the effects of the proposed Transportation 2030 Plan, it is necessary to make assumptions about future environmental conditions at the time the Plan is fully implemented. Since implementation of the Plan would be spread over 25 years, the horizon year is 2030. In this approach, the physical components of the proposed Transportation 2030 Plan can be compared to future baseline conditions in 2030.

Other key assumptions in the impact analysis include the following:

- The base year or existing conditions for the analysis is 2000, as that is the year for which MTC has the most current validated travel demand model for the transportation network.
- ABAG's adopted *Projections 2003* forms the basis for developing future baseline population and employment scenarios for the Proposed Project. See Chapter 2.11 (Growth Inducing Effects) and Appendix E for further details on growth projections.
- Both the air quality and transportation analyses evaluate the effects of the proposed Transportation 2030 Plan investments assuming the projected population and employment growth in the region and its effect on generating increased travel. Thus, for these two issue areas, the travel demand and associated air emissions produced for the proposed project conditions is considered identical to the cumulative condition for CEQA purposes.
- The existing conditions scenario is based on transit service levels in 2000, while the No Project alternative assumes 2004 transit service levels. Because of the economic downturn after 2000, the 2004 transit service levels reflect some significant service cutbacks. The No Project alternative assumes that the region will only be able to afford the 2004 service levels in 2030 despite the fact that more people will be using the transportation network overall.

- This analysis does not consider phasing of improvements or interim stages of the proposed Transportation 2030 Plan between 2000 and 2030, as the purpose of the analysis is to evaluate the Plan as a whole.
- As a program level EIR, individual project impacts are not addressed in detail; the focus of this analysis is to address the impacts of projects, which, individually or in the aggregate, may be regionally significant. Individual projects will be subject to subsequent environmental review and development of site-specific mitigation measures, as required by CEQA and/or NEPA. MTC will require compliance with CEQA and NEPA (if applicable) prior to approving projects for funding.

IMPACT SIGNIFICANCE

In many cases, the significance criteria require comparison of the Proposed Project to the No Project Alternative, as the No Project Alternative represents the "future baseline." However, in all cases, the Proposed Project is first compared to existing conditions, as required by CEQA.

For each issue area, criteria of significance are established, based on normally accepted standards for environmental review and State CEQA guidelines. Impacts are individually numbered within each issue area and are classified as follows based on the assessment of the impact before applying mitigation:

Significant, unavoidable: cannot be mitigated to a level that is less than significant;

Significant, mitigable: can be mitigated to a level that is less than significant;

Adverse (or less than significant): does not exceed the significance criteria or threshold; or

Beneficial: a positive impact or effect, relative to the current environmental conditions.

For each impact that is classified as significant, mitigation measures are recommended. The effectiveness of recommended mitigation measures is assessed and the residual impact after mitigation is identified.

MITIGATION

A majority of the improvements identified in the proposed Transportation 2030 Plan will be undertaken by other agencies. Therefore, many of the mitigation measures will be the responsibility of the agencies implementing a specific transportation project or program.

ORGANIZATION OF IMPACT ANALYSES

Each impact area is analyzed in a separate chapter. Each chapter is organized as follows:

- Environmental setting – both the physical setting or existing conditions and the regulatory setting applicable to the individual issue area;
- Criteria of significance – the environmental thresholds used as the basis for determining the significance of potential impacts;
- Method of analysis – a description of the methodology used to assess impacts within a particular issue area;
- Summary of impacts – a brief summary of potential short-term and long-term direct and cumulative effects; and
- Impacts and mitigation measures – individually numbered impact statements (including identification of both proposed project and cumulative effects) and corresponding mitigation measures.

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2.1 Transportation

This chapter describes the current transportation conditions and examines the effects of the proposed transportation improvements in transit, freeways and local roads, and operational strategies in the proposed Transportation 2030 Plan on travel conditions in 2030. For analytic purposes in this EIR, the year 2000 is the base year (existing conditions), while the year 2030 is the horizon year (future conditions) when the proposed Transportation 2030 Plan will be fully implemented.

ENVIRONMENTAL SETTING

PHYSICAL SETTING

Existing Transportation Conditions (2000)

The Bay Area currently contains over 19,600 miles of local streets and roads, and over 1,400 miles of state highways. In addition, there are over 9,040 transit route miles of service[1] including rapid rail, light rail, commuter, diesel and electric buses, cable cars and ferries. The Bay Area also has an extensive local system of bicycle routes and pedestrian facilities (paths and sidewalks).

As displayed on Table 2.1-1, cars, buses and commercial vehicles travel about 143 million miles a day on the Bay Area freeways and local roads, and transit serves about 1.7 million riders on the average weekday. As shown on Table 2.1-2, of the trips made by Bay Areas residents, 25 percent are for work, 24.7 percent for shopping and other activities, 11.7 percent for recreation, and 10.9 percent for school. Furthermore, the average one-way commute distance for the region is about 11.6 miles, as shown in Table 2.1-3. San Francisco residents have the shortest average one-way commute distance (7.2 miles), while Solano County residents have the longest average one-way commute distance (18.2 miles).

Table 2.1-1: Bay Area Travel Behavior, 2000

Daily Transit Boardings[1]	1,714,300
Daily Vehicle Trips[2]	17,098,100
Daily Vehicle Miles of Travel (VMT)	143,495,300
Daily Vehicle Hours of Delay	355,600
Average Delay per Vehicle (Minutes)	1.2

[1]Daily transit boardings includes transfer boardings

[2]Includes interregional trips

Source: Metropolitan Transportation Commission, 2004

[1] Transit route miles in service estimate is based on a 2001 transit network. Service cuts have occurred regionwide since 2001.

Table 2.1-2: Trip Purpose, 2000

	2000	*% of Total*
Work	5,248,300	25.0%
Shop/Other	5,201,100	24.7%
Social/Recreation	2,469,200	11.7%
School	2,294,600	10.9%
Other*	5,820,700	27.7%
Total	**21,033,800**	**100.0%**

*Other refers to non-home-based trips (such as work-based errands)

Source: Metropolitan Transportation Commission, 2004

Table 2.1-3: Average One-Way Commute Distance (in Miles) by County, 2000

County of Residence	*Commute Distance*
Alameda	11.6
Contra Costa	15.5
Marin	11.5
Napa	11.6
San Francisco	7.2
San Mateo	10.6
Santa Clara	9.8
Solano	18.2
Sonoma	15.0
Regional Average	*11.6*

Source: Metropolitan Transportation Commission, 2004

Travel Trends: Transportation Modes, Travel Time to Work, and Commute Patterns

According to the U.S. Census, Bay Area residents use a range of transportation modes to get to their work places, as demonstrated in Table 2.1-4. At a regional level, the share of workers driving alone to work has been fairly constant over the past ten years, decreasing from 68.2 percent of commuters in 1990 to 68.0 percent of commuters driving alone to work in 2000. Likewise, the carpool share of commuters has been very stable, declining from 13.0 percent in 1990 to 12.9 percent in 2000. Transit commuter shares have increased slightly, from 9.5 percent in 1990 to 9.7 percent in 2000. Commuters walking to work showed the most significant decrease in the commuter share, decreasing from 3.6 percent of Bay Area commuters in 1990 to 3.2 percent in 2000. In addition, other modes (bicycle, motorcycle, and other) declined in share as well, from 2.3 percent in 1990 to 2.2 percent in 2000. Interestingly, the number of Bay Area residents working from home has increased from 3.4 percent of all Bay Area workers in 1990 to 4.0 percent in 2000.

Table 2.1-4: Bay Area Resident Workers by Means of Transportation to Work, 1990 - 2000

Year	Drive Alone	% of Total	Carpool	% of Total	Transit	% of Total	Walk	% of Total	Other	% of Total	Work at Home	% of Total	Total Workers
1990	2,104,716	68.2	399,673	13.0	293,581	9.5	111,968	3.6	69,610	2.3	3,085,634	3.4	3,085,634
2000	2,248,095	68.0	426,500	12.9	321,053	9.7	106,063	3.2	71,605	2.2	132,735	4.0	3,306,051

Source: U.S. Census 1990 and 2000

The amount of time it takes to travel to work has increased over the past decade. Table 2.1-5 shows the average reported travel time to work from the 1990 and 2000 Census. The average one-way commute duration for the Bay Area increased by 14.8 percent between 1990 and 2000, from 25.6 minutes in 1990 to 29.4 minutes in 2000. (Some of this increase may be due to the tendency of census respondents to round their commute times to the nearest five or ten minutes). At a county level, Contra Costa County shows the highest absolute gain in average commute time (+5.1 minutes), from 29.3 minutes in 1990 to 34.4 minutes in 2000. Alameda County experienced the highest percent gain in average commute time (+19.4 percent), from 25.8 minutes in 1990 to 30.8 minutes in 2000.

Table 2.1-5: Average Travel Time to Work, 1990 - 2000

	Commuter Duration (One-Way, minutes)		
County of Residence	1990	2000	Change
Alameda	25.8	30.8	19.4%
Contra Costa	29.3	34.4	17.4%
Marin	28.4	32.3	13.7%
Napa	21.4	24.3	13.6%
San Francisco	26.9	30.7	14.1%
San Mateo	24.0	27.0	12.5%
Santa Clara	23.3	26.1	12.0%
Solano	28.2	31.8	12.8%
Sonoma	24.1	26.8	11.2%
Bay Area	25.6	29.4	14.8%

Source: U.S. Census 1990 and 2000

Bay Area residents are increasingly commuting outside their county of residence to jobs in other counties. Table 2.1-6 shows the number of workers who live and work in the same county as well as the number of residents who commute to other counties for work from 1990 to 2000. Alameda County showed the highest absolute increase in the number of its residents who commute out to other counties (+37,964), from 187,029 residents in 1990 to 224,993 residents in 2000. Sonoma County showed the highest percent gain in out-commuting (+4.6 percent), from 38.6 percent in 1990 to 43.2 percent in 2000. These commute patterns are due largely to the concentration of employment in Alameda, San Francisco, and Santa Clara counties.

Table 2.1-6: Bay Area Resident Workers Commute Patterns by County, 1990 - 2000

	Live Here, Work Here			*Live Here, Work Elsewhere*			*% Resident Workers Commuting Out*		
County	*1990*	*2000*	*Change*	*1990*	*2000*	*Change*	*1990*	*2000*	*Change*
Alameda	446,162	453,917	1.7%	187,029	224,993	20.3%	29.5%	33.1%	3.6%
Contra Costa	239,908	254,749	6.2%	161,265	187,259	16.1%	40.2%	42.4%	2.2%
Marin	73,235	78,681	7.4%	51,845	47,965	-7.5%	41.4%	37.9%	-3.6%
Napa	38,431	44,341	15.4%	13,142	13,052	-0.7%	25.5%	22.7%	-2.7%
San Francisco	307,400	322,009	4.8%	74,909	96,544	28.9%	19.6%	23.1%	3.5%
San Mateo	201,506	206,093	2.3%	145,053	148,003	2.0%	41.9%	41.8%	-0.1%
Santa Clara	710,365	727,915	2.5%	86,240	101,012	17.1%	10.8%	12.2%	1.4%
Solano	97,477	99,231	1.8%	61,236	75,340	23.0%	38.6%	43.2%	4.6%
Sonoma	155,802	184,423	18.4%	34,629	40,524	17.0%	18.2%	18.0%	-0.2%

Source: U.S. Census 1990 and 2000

REGULATORY SETTING

The federal and state legal framework for the proposed Transportation 2030 Plan is described below.

Federal Statutes

Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century (TEA-21) was signed into law in 1998 and built upon the initiatives established in the prior federal transportation legislation of 1991 (Intermodal Surface Transportation Efficiency Act, or ISTEA). TEA-21 reauthorized highway, highway safety, transit, and other surface transportation programs for six years (1998-2003), and significantly increased overall funding for transportation. TEA-21 continues the program structure established for highways and transit under the earlier ISTEA legislation, such as flexibility in the use of funds for a variety of locally defined purposes, including helping meet federal air quality standards (determining conformity of the Transportation 2030 Plan with the federal air quality plan is a separate process from this EIR). TEA-21 also encourages development of Intelligent Transportation Systems (ITS) to help improve operations and management of transportation systems and vehicle safety. TEA 21 expired on September 30, 2003. Congress has not yet passed new authorizing legislation.

Metropolitan Planning General Requirements

Under TEA-21, the U.S. Department of Transportation (USDOT) requires that Metropolitan Planning Organizations, like MTC, prepare long-range transportation plans and that these plans

be updated every three years. MTC adopted the 2001 Regional Transportation Plan (RTP) in December 2001.

The proposed Transportation 2030 Plan is considered the 2005 update to the 2001 RTP, and will replace the 2001 RTP when adopted.

Key federal requirements for long range plans include the following:

- RTPs must be developed through an open and inclusive process that ensures public input and seeks out and considers the needs of those traditionally under served by existing transportation systems;
- RTPs must be developed for a period of not less than 20 years into the future; RTPs must reflect the most recent assumptions for population, travel, land use, congestion, employment, and economic activity;
- RTPs must have a financially constrained element, and transportation revenue assumptions must be reasonable; RTPs may include, for illustrative purposes, additional projects that would be included in the adopted RTP if reasonable additional resources beyond those identified in the financial plan were to become available.
- RTPs must conform to the applicable federal air quality plan, called the State Implementation Plan (SIP), for ozone and other pollutants for which an area is not in attainment; and
- RTPs must consider seven planning factors and strategies, in the local context.[2]

National Environmental Policy Act

The National Environment Policy Act of 1969 (NEPA) requires federal agencies to assess the possible environmental consequences of projects which they propose to undertake, fund, or approve. While the RTP is not subject to NEPA, individual federally funded programs or projects requiring federal approval will be subject to a NEPA evaluation.

State Statutes

The State requirements largely mirror the Federal requirements. State planning guidelines call for the adoption and submittal of a RTP every three years to the California Transportation Commission (CTC) and Caltrans. If the current RTP is determined to be adequate such that an update is not warranted, a Regional Transportation Planning Agency, such as MTC, may re-adopt the current RTP. Also, the guidelines specify three elements of the RTP – a policy element, an action element, and a financial element.

To qualify for funding in the State Implementation Improvement Program (STIP), projects included in a Regional Transportation Improvement Program (RTIP) and Interregional Transportation Improvement Program (ITIP) must be consistent with adopted RTPs. Given the

[2] For more details on the seven planning factors, see California Transportation Commission, *Regional Transportation Guidelines*, December 1999.

requirements of Government Code 65080(c), the CTC will only consider STIP funding for projects consistent with an RTP adopted within three years of STIP adoption.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires State and local agencies to consider the environmental consequences of projects that they undertake, fund, or permit. The RTP and any subsequent revisions, amendments, or updates must be in compliance with CEQA. Typically, a program or master Environmental Impact Report (EIR) is prepared for the RTP. This EIR for the proposed Transportation 2030 Plan is a program EIR.

IMPACT ANALYSIS

SIGNIFICANCE CRITERIA

According to CEQA guidelines, a project will normally have a significant effect if it would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system. This definition is somewhat limited for the purposes of a regional transportation program EIR, therefore, a more expansive set of criteria has been defined to determine whether transportation improvements in the proposed Transportation 2030 Plan will have a significant adverse effect on future regional mobility in the Bay Area:

Travel Time. This is a central measure of mobility since transportation improvements are generally intended to reduce travel times, particularly in highly congested corridors.

- **Criterion 1: Average travel time per trip.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant adverse impact if it results in an appreciable increase in average travel time per trip compared to the No Project alternative.

Accessibility. Changes in accessibility will measure how easy it is to get to different types of activities or opportunities around the region. Arguably the most critical activity/opportunity is getting to work, because work supplies the resources to engage in other activities. However, since the accessibility measure is based on jobs, and jobs are a surrogate for other types of activities besides work (e.g., shopping, recreation, school, etc.), the accessibility measure also serves as a proxy for other trip purposes.

- **Criterion 2: Number of work opportunities within 15, 30, and 45 minutes by auto and transit.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant adverse impact if it results in an appreciable decrease in the average number of jobs within specified travel times from home by auto (combines single occupant autos and carpools) and transit compared to the No Project alternative.

Traffic/Congestion. This measure is the closest criterion to the CEQA language and thus, the EIR evaluates the change in total vehicle trips (traffic) and changes in the amount of travel at different levels of service on freeways and local streets (congestion).

- **Criterion 3: Vehicle trips.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant adverse impact if it results in an appreciable increase in vehicle trips (traffic) compared to the No Project alternative.

- **Criterion 4: Vehicle miles traveled (VMT) at level of service (LOS) F.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant adverse impact if it results in an appreciable increase in vehicle miles traveled (VMT) at LOS F compared to the No Project alternative (LOS F defines a condition on roads where traffic substantially exceeds capacity, resulting in very low speeds and stop and go conditions for extended periods of time).

METHOD OF ANALYSIS

The EIR analysis is based on travel projections developed using MTC's travel demand forecasting model. This model is actually a set of individual models that perform different functions, leading to projections of future Bay Area travel. The models are developed from a database that consists of the MTC 1990 Household Travel Survey and traffic and transit counts that are used to validate the model results. Available Census 2000 data was also used in re-validating the various components of the travel models to a 2000 base year[3]. The base year (existing conditions) for the analysis is 2000, the year of the last major travel model validation effort.

In addition, MTC uses the latest long-run economic-demographic forecasts adopted by the Association of Bay Area Governments (ABAG) – the latest forecasts being *Projections 2003*. It is important to point out that *Projections 2003* is different than past forecasts in that it is founded on a vision of how the Bay Area wishes to direct residential and job growth in the future based on alternative land use policies developed through ABAG's recent Smart Growth Project. ABAG's *Projections 2003* represent a policy forecast based on local jurisdictions, the state and other agencies cooperating to institute a new growth pattern that is mainly transit-oriented, and focuses development in urban core areas throughout the region.

Typically, travel demand models are based on a four-step process. These four steps are: trip generation (how much travel?), trip distribution (where do people travel?), mode choice (what mode of travel?) and trip assignment (what road/highway or transit route?).

MTC additionally employs three more steps beyond the basic four-step process. These additional steps are auto ownership models (how many cars does a household own?), working household models (do households have workers? If so, how many workers?) and time-of-day models (when do people travel during the day? How many people travel during the peak travel commute period?).

[3] Metropolitan Transportation Commission, 2004 Base Year Validation of Travel Demand Models for San Francisco Bay Area (BAYCAST-90) Technical Summary, May 2004

Key Assumptions

Underpinning the models is a series of key assumptions. These assumptions fall under two basic categories:

Travel Demand Assumptions:

- Land use/demographics (population, housing, jobs, workers, auto ownership, etc.).
- Pricing (gas costs, parking costs, bridge tolls, transit fares, etc.).

Transportation System Supply Inputs:

- Networks (capacity of system of streets and highways and frequency and travel time for transit routes).

References

For more information, MTC has a large body of detailed published documentation regarding its travel demand models. These, and other documents can be obtained from the MTC library, or from MTC's home page on the World Wide Web at www.mtc.ca.gov.

FUTURE TRANSPORTATION CONDITIONS (2030)

In order to assess potential impacts, it is necessary to first describe future baseline transportation conditions in terms of projected trips, projected travel modes and vehicle travel, and proposed transportation supply.

Growth in Trips

Projected population and employment growth in the Bay Area over the next 25 years, as defined by ABAG's *Projections 2003*, will lead to increases in the number of trips made by persons traveling in the Bay Area (called person trips) and hence the need for additional transportation investment. These trips are made for a variety of purposes as shown in Table 2.1-7. Overall, a 35 percent increase in daily person trips is projected between 2000 and 2025. This growth rate is higher than population growth, projected at 29 percent, but lower than the growth in employment (38 percent). Home-based work trips are projected to increase at the fastest rate (44 percent), which is 5 percent more than the growth rate in Bay Area employment. As with the movement of people, the number of commercial truck trips (which includes heavy trucks and 4-tire service delivery trucks) will also increase to serve both the new population and additional freight needs of a growing economy. These trips are estimated to increase by 37 percent.

Table 2.1-7: Growth in Regional Population/Employment, Vehicle Availability Level, and Trips (2000 and 2030)

			Change	
	2000	*2030*	*Numerical*	*Percent*
Demographic Characteristics				
Total Population	6,783,762	8,780,300	1,996,538	29%
Employed Residents	3,605,675	4,983,240	1,377,565	38%
Total Employment	3,753,670	5,226,400	1,472,730	39%
Mean Household Income (2000$)	$92,500	$118,200	$25,700	28%
Regional Households by Vehicle Availability Level				
Zero-Vehicle Households	247,200	311,400	64,200	26%
Total Vehicles in Households	4,324,000	5,746,700	1,422,700	33%
Average Vehicles in Households	1.75	1.80	0.05	3%
Trip Purpose				
Home-Based Work	5,248,300	7,555,500	2,307,200	44%
Home-Based Shop/Other	5,201,100	7,124,100	1,923,000	37%
Home-Based Social/Recreation	2,469,200	3,402,700	933,500	38%
Home-Based School	2,294,600	2,491,400	196,500	9%
Non-Home-Based	5,820,700	7,919,100	2,098,600	36%
Sub-Total, Intraregional Personal Travel	*21,033,800*	*28,492,900*	*7,459, 100*	*35%*
Commercial	3,404,400	4,654,500	1,250,100	37%

Source: Metropolitan Transportation Commission, 2004; Association of Bay Area Governments, Projections 2003

Projected Changes in Transportation Mode and Vehicle Travel

As discussed above, the provision of transportation system capacity improvements in specific corridors will affect traffic levels on regional facilities and the use of Bay Area transit systems. Table 2.1-8 provides measures of regional travel activity for 2030, as forecasted by MTC.

Table 2.1-8: Projected Changes in Travel Behavior (2000 to 2030)

				Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
	2000	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
Trips by Means of Transportation[1]							
Auto	17,597,300	23,719,700	23,583,600	5,986,300	34%	-136,100	-1%
Transit	1,175,600	1,727,000	1,869,700	694,100	59%	142,700	8%
Bicycle	310,600	405,200	403,100	92,500	30%	-2,100	-1%
Walk	1,950,400	2,640,900	2,636,400	686,000	35%	-4,500	0%
Total	21,033,800	28,492,900	28,492,900	7,459,100	35%	0	0%
Share of Trips by Means of Transportation							
Auto	83.7%	83.2%	82.8%				
Transit	5.6%	6.1%	6.6%				
Bicycle	1.5%	1.4%	1.4%				
Walk	9.3%	9.3%	9.3%				
Total	100.0%	100.0%	100.0%				
Daily Transit Boardings[2]	1,714,300	2,504,400	2,815,500	1,101,200	64%	311,100	12%
Daily Vehicle Trips[3]	17,098,100	23,564,600	23,469,400	6,371,300	37%	-95,200	0%
Daily Vehicle Miles of Travel (VMT)	143,495,300	203,072,600	200,878,200	57,382,900	40%	-2,194,400	-1%
Daily Vehicle Hours of Delay (VHD)	355,600	1,073,900	721,300	365,700	103%	-352,600	-33%
Average Delay per Vehicle (Minutes)	1.2	2.7	1.8	1	48%	-1	-33%

[1]Excludes commercial and interregional trips

[2]Daily transit boardings includes transfer boardings

[3]Includes interregional trips

Source: Metropolitan Transportation Commission, 2004

Proposed Transportation System Capacity Increases (Supply)

The proposed Transportation 2030 Plan consists of funding for transit and highway maintenance, rehabilitation and operations, system management/customer service programs, and system expansion, as described in Chapter 1.2. Maintenance and rehabilitation projects will not affect people's travel behavior, and system management will affect travel behavior in subtle and localized ways that are generally difficult to assess in a regional analysis. Projects that expand transportation system capacity will be responsible for the greatest impact on travel behavior and are therefore given the bulk of the attention in this EIR analysis. Table 2.1-9 provides a measure of the relative level of expansion contemplated in the proposed Transportation 2030 Plan.

Table 2.1-9: Roadway Lane Miles and Transit Seat Miles (2000 to 2030)

				Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
	2000	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
Freeways	4,500	4,800	5,400	900	20%	600	13%
Mixed Flow	4,300	4,400	4,600	300	7%	200	5%
HOV	300	400	800	500	167%	400	100%
Expressways	1,000	1,000	1,100	100	10%	100	10%
Mixed Flow	900	1,000	1,000	100	11%	0	0%
HOV	50	100	100	50	100%	0	0%
Arterial / Other	14,600	14,900	15,100	500	3%	200	1%
Roadway Lane Miles Total	20,100	20,700	21,600	1,500	7%	900	4%
High Occupancy Toll (HOT) Lanes	0	0	837	837	100%	837	100%
Bus Transit	1,912,700	1,262,700	2,037,400	124,700	6.5%	810,700	61%
Light Rail Transit	179,600	206,500	280,500	100,900	56%	74,000	36%
Rapid Rail Transit	1,059,600	1,087,700	1,918,800	859,200	81%	831,100	76%
Commuter Rail Transit	678,700	762,800	828,000	149,300	22%	65,200	9%
Ferry Transit	110,900	126,800	227,100	116,200	105%	100,300	79%
Transit Seat Miles Total	3,941,300	3,446,600	5,291,800	1,150,500	34%	1,645,200	48%

[1]AM peak period passenger seat miles per hour

Source: Metropolitan Transportation Commission, 2004

SUMMARY OF IMPACTS

Overall, the proposed Transportation 2030 Plan (Proposed Project) provides improved mobility for the Bay Area in 2030 compared to the No Project alternative for all impact measures, due to the new investments in road and transit capacity. However, when compared to 2000 existing conditions these same road and transit improvements are not sufficient to improve average travel time or vehicle miles traveled at LOS F conditions because of the more significant effects of increasing population and jobs on generating additional demand for travel.

Implementation of projects in the proposed Transportation 2030 Plan will be phased over many years, so that impacts will change year to year. As projects advance from planning into implementation, short-term impacts, such as delays to travelers, would be created by congestion in and around construction zones. Significant numbers of construction projects occurring at the same time could cause cumulative regional delay impacts.

IMPACTS & MITIGATION MEASURES

Average Travel Time Per Trip

Impact

2.1-1 The Proposed Project provides a slight reduction in average travel time for work trips (2 percent), non-work trips (1 percent), personal trips (1 percent), and truck trips (1 percent) when compared to the No Project. (*No Adverse Impact*)

As shown in Table 2.1-10, average travel time per trip for both the No Project and Project alternatives is projected to increase relative to existing conditions. This increase reflects the effect of continued growth in regional travel demand (trips) across all modes without a corresponding expansion in the capacity of the regional transportation system to accommodate these trips.

However, the Proposed Project would provide an overall improvement compared to the No Project alternative for both work trips (2 percent reduction in travel time per trip) and non-work trips (1 percent reduction in travel time per trip), for an overall 1 percent improvement.

Table 2.1-10: Average Travel Time Per Trip (2000 to 2030, in minutes)

				Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
	2000	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
Work Trips, Total	28.4	31.8	31.1	2.7	10%	-0.7	-2%
Non-Work Trips, Total	15.8	16.1	16.0	0.2	1%	-0.1	-1%
Personal Trips, Total	18.9	20.2	20.0	1.1	6%	-0.2	-1%
Truck Trips, Total	11.4	11.5	11.4	0.0	0%	-0.1	-1%

Source: Metropolitan Transportation Commission, 2004

Mitigation Measures

None. There are no significant adverse effects on average travel time per trip due to implementation of the proposed Transportation 2030 Plan.

Accessibility

Impact

2.1-2 The Proposed Project provides improved accessibility to jobs by both auto and transit modes for all time intervals of 15, 30 and 45 minutes. (*Beneficial*)

Accessibility is calculated as the average number of total jobs within 15, 30 or 45 minutes of the neighborhood-of-residence by mode of transportation. For regional transportation planning the Bay Area is divided into 1,454 neighborhoods (travel analysis zones). Mode of transportation includes drive alone, carpool, transit, bicycle and walk. After the total employment accessible to each neighborhood is obtained, each neighborhood's accessibility value is weighted by the total population of the neighborhood/zone, and all zones are then summed to derive a regional weighted accessibility value. Higher accessibility values means better accessibility to jobs, shopping and other opportunities. Remote communities on the periphery of the Bay Area (e.g., Guerneville, Cloverdale, Gilroy) tend to have the lowest accessibility scores.

Projected changes in accessibility from 2000 to 2030 are the result of three factors: (1) increased job growth relative to population growth, (2) changing geographic relationships between the location of jobs and housing in the region, and (3) the effects of the transportation investments in the Proposed Project. Compared to 2000, accessibility to total jobs would greatly increase for both auto and transit users under the Proposed Project, as shown in Table 2.1-11. The increase in auto and transit accessibility is primarily related to the shift in where people live in relation to their jobs. ABAG's *Projections 2003* shows that the highest net residential and employment densities are concentrated in the urban core areas of San Francisco, Alameda, and Santa Clara counties. Comparing the Proposed Project to the No Project alternative shows that the Proposed Project will result in modest improved accessibility for autos and a more significant improvement in accessibility for transit users—given the 48 percent increase in the regional transit supply in the Proposed Project compared to the No Project alternative.

Table 2.1-11: Accessibility to Jobs (2000 to 2030)

				Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
	2000	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
Number of Total Jobs Accessible by Auto							
Within 15 minutes	109,200	131,400	133,300	24,100	22%	1,900	1%
Within 30 minutes	476,800	553,500	569,800	93,000	20%	16,300	3%
Within 45 minutes	960,300	1,076,000	1,114,300	154,000	16%	38,300	4%
Number of Total Jobs Accessible by Transit							
Within 15 minutes	5,100	7,000	7,900	2,800	55%	900	13%
Within 30 minutes	41,200	57,700	66,800	25,600	62%	9,100	16%
Within 45 minutes	136,000	176,300	211,400	75,400	55%	35,100	20%

Source: Metropolitan Transportation Commission, 2004

Mitigation Measures

None. There are no significant adverse effects on accessibility to jobs by auto or transit due to implementation of the proposed Transportation 2030 Plan.

Daily Vehicle Trips

Impact

2.1-3 The Proposed Project reduces the average weekday vehicle trips for all nine counties when compared to the No Project. (***No Adverse Impact***)

Forecasted daily vehicle trips in the Bay Area would increase by about 35 percent from 2000 to 2030 due to growth in the region. San Francisco, Marin and Napa counties show the largest absolute growth in vehicle trips over this period.

Overall, the Proposed Project would reduce vehicle trips by 1 percent compared to the No Project alternative. As illustrated in Table 2.1-12, a comparison between the Proposed Project and No Project alternative shows that the Proposed Project reduces vehicle trips in all counties. Significant decreases in vehicle trips are evident in a number of counties-of-origin, most notably: Napa County (32,500 less trips in the Proposed Project), Marin County (16,500 less trips in the Proposed Project), Alameda County (14,400 less trips in the Proposed Project), and Contra Costa County (12,700 less trips in the Proposed Project).

Mitigation Measures

None. There are no significant adverse effects on the number of daily vehicle trips due to implementation of the proposed Transportation 2030 Plan.

Table 2.1-12: Average Weekday Daily Vehicle Trips by County-of-Origin

				Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
County-of-Origin	*2000*	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
San Francisco	1,087,700	1,304,000	1,289,600	201,900	19%	-14,400	-1%
San Mateo	1,624,800	2,090,500	2,077,800	453,000	28%	-12,700	-1%
Santa Clara	3,921,300	5,380,800	5,364,300	1,443,000	37%	-16,500	-0.3%
Alameda	2,555,400	3,521,900	3,489,400	934,000	37%	-32,500	-1%
Contra Costa	1,714,900	2,448,900	2,441,200	726,300	42%	-7,700	-0.3%
Solano	620,600	982,000	978,100	357,500	58%	-3,900	-0.4%
Napa	238,500	309,300	309,000	70,500	30%	-300	-0.1%
Sonoma	853,400	1,189,700	1,186,200	332,800	39%	-3,500	-0.3%
Marin	512,000	640,900	637,100	125,100	24%	-3,800	-1%
Regional Total	**13,128,600**	**17,868,100**	**17,772,800**	**4,644,200**	**35%**	**-95,300**	**-1%**

[1]*Average weekday daily vehicle trips include intra-regional personal travel and exclude inter-regional and truck trips.*

Source: Metropolitan Transportation Commission, 2004

Vehicle Miles Traveled By Facility Type and V/C Ratio (Level of Service)

Impact

2.1-4 The Proposed Project provides an overall reduction of 20 percent in vehicle miles traveled at Level of Service F for both freeways and expressways and arterial facilities when compared to the No Project. (*No Adverse Impact*)

Table 2.1-13 displays vehicle miles of travel by type of travel (i.e., freeways versus arterials and expressways) and volume-to-capacity ratio (V/C). The volume-to-capacity ratio is a way of describing the level of service experienced by users of a road, which depends on the number of vehicles traveling on the facility and the available capacity. As traffic increases, the V/C ratio rises to a point of saturation where the road cannot carry any more vehicles (a ratio of 1.0 or greater). V/C ratios are also commonly expressed as a range of letters from A to F, with "A" being the least congested, and "F" indicating more traffic than the road's capacity. When V/C is expressed as a letter (A-F), the condition is referred to level-of-service (LOS).

Overall, regional VMT during the morning (AM) peak period is projected to increase by 25 percent over existing conditions for the Proposed Project. The amount of VMT at LOS F (severe congestion) for all facilities would increase 92 percent between 2000 and 2030. Thus, altered land use patterns and new transportation investment will help but not fully mitigate the impacts of continued regional growth on the transportation system.

However, relative to the No Project alternative, the implementation of the Proposed Project will reduce the amount of VMT at LOS F by 20 percent on freeways and 24 percent on expressways and arterials. Thus, the proposed Transportation 2030 Plan would represent an improvement over the No Project alternative.

Mitigation Measures

None. There are no significant adverse effects on vehicle miles traveled at LOS F due to implementation of the proposed Transportation 2030 Plan.

Table 2.1-13: AM Peak Period Regional Vehicle Miles Traveled (VMT) by Facility Type and Volume to Capacity (V/C) Ratio (2000 to 2030)

					Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
V/C Ratio	*LOS*	*2000*	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
Freeways								
< 0.75	A-C	6,073,100	5,422,500	7,037,400	964,300	16%	1,614,900	30%
0.75 to 1.00	D-E	5,012,500	6,927,500	6,234,700	1,222,200	24%	-692,800	-10%
> 1.00	F	819,500	1,939,100	1,557,200	737,700	90%	-381,900	-20%
Total		11,905,100	14,289,100	14,829,300	2,924,200	25%	540,200	4%
Expressways and Arterials								
< 0.75	A-C	5,469,900	6,343,300	6,323,100	853,200	16%	-20,200	0%
0.75 to 1.00	D-E	1,043,900	2,229,700	1,739,600	695,700	67%	-490,100	-22%
> 1.00	F	118,800	319,700	244,500	125,700	106%	-75,200	-24%
Total		6,632,600	8,892,700	8,307,200	1,674,600	25%	-585,500	-7%
All Facilities								
< 0.75	A-C	11,543,000	11,765,800	13,360,500	1,817,500	16%	1,594,700	14%
0.75 to 1.00	D-E	6,056,400	9,157,200	7,974,300	1,917,900	32%	-1,182,900	-13%
> 1.00	F	938,300	2,258,800	1,801,700	863,400	92%	-457,100	-20%
Total		18,537,700	23,181,800	23,136,500	4,598,800	25%	-45,300	0%

[1]AM peak period is two hours.
[2]Freeways include Freeways and Freeway-to-Freeway connectors. Expressways and Arterials include all other facilities.
[3]LOS - Level of Service measures traffic density in a range of A to F.
[4]LOS A are free-flow conditions with no delay; LOS D-E are more congested conditions with some delay possible; LOS F represents conditions of over-capacity and significant delay.

Source: Metropolitan Transportation Commission, 2004

2.2 Air Quality

This air quality analysis focuses on the criteria pollutants that affect public health and that the Bay Area is currently designated as a non-attainment area for the national standards[1] (ozone) and state standards (ozone and particulate matter). This chapter also describes toxic air contaminants (TACs), which refers to pollutants that occur in relatively low concentrations and can have adverse health impacts, but for which no ambient air quality standards have been established. In both cases, the pollutants discussed are those that are produced by mobile sources-autos, buses, and trucks. Implementation of the proposed transportation improvements in the proposed Transportation 2030 Plan could affect these pollutants through changes in travel behavior and vehicle activity (amount of travel and speed).

ENVIRONMENTAL SETTING

PHYSICAL SETTING

The main pollutants addressed in this EIR are regional in character. Certain types of pollutants produced by automobiles and transit vehicles can affect public health. Electrically powered transit vehicles produce pollution indirectly at the source of the power generation. Localized pollutants such as carbon monoxide and particulate matter are more appropriately addressed in project-level environmental documents.

Climate, Meteorology, and Topography

Regional wind patterns vary from season to season. Wind tends to move from areas of high-pressure to low-pressure areas. In warmer months, this means that air blows on-shore from the Pacific Ocean to inland areas. While Pacific Ocean air is generally free of harmful air pollutants, it receives emissions from numerous sources (anthropogenic and biogenic), and will then carry these pollutants to areas many miles away. Mountains and valleys often affect on-shore winds. This means that a wind pattern that started as northwesterly will often swing 90 degrees or more when it encounters topographic features.

Normally, air temperatures decrease with increasing elevations. Sometimes this normal pattern is inverted, with warmer air aloft, and cool air trapped near the earth's surface. This phenomenon occurs in all seasons. In summer, especially when wind speeds are very low, a strong inversion will trap air emissions and high levels of ozone smog can occur. In winter, a strong inversion can trap emissions of particulate and carbon monoxide near the surface, resulting in unhealthful air quality.

Wet winters and dry summers characterize the region's Mediterranean climate. Rainfall totals can vary widely over a short distance, with windward coastal mountain areas receiving over 40 inches

[1] U.S. EPA has made a finding that the Bay Area has attained the national 1-hour ozone standard, and the the Bay Area Air Quality Management District, MTC and ABAG (co-lead agencies) are in the process of preparing a redesignation request and a maintenance plan.

of rain, while leeward areas receive about 15 inches. During rainy periods, horizontal and vertical air movement ensures rapid pollutant dispersal. Rain also washes out particulate and other pollutants.

The Bay Area topography is complex, consisting of coastal mountain ranges, inland valleys, and bays. The Pacific Ocean bounds the area to the west with warmer inland valleys to the south and east. The only major break in California's Coast Range occurs at San Francisco Bay. The gap on the western side is called the Golden Gate, and on the eastern side is called the Carquinez Strait. These gaps allow air to pass between the Central Valley and the Pacific Ocean. The general region lies in the semi-permanent high-pressure zone of the eastern Pacific, resulting in a mild climate tempered by cool sea breezes with light average wind speeds. The usually mild climatological pattern is interrupted occasionally by periods of extremely hot weather, winter storms, or offshore winds.

The climatological pollution potential of an area is largely dependent on winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and low inversions produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 miles per hour (mph), smog potential is greatly reduced. Because of wind patterns, and to a lesser degree the geographic location of emission sources, high ozone levels usually occur in inland valleys, such as the Livermore area. High particulate mater (PM_{10}) levels can occur in most valley areas where residential wood smoke and other pollutants are trapped by inversions and stagnant air.

Criteria Pollutants

The federal Clean Air Act (CAA) of 1970, amended in 1977 and 1990 (42 USC 7506(c)), was enacted for the purposes of protecting and enhancing the nation's air resources to benefit public health. In 1971, to achieve the purposes of Section 109 of the act, the U.S. Environmental Protection Agency (EPA) promulgated National Ambient Air Quality Standards (NAAQS). The NAAQS require that certain pollutants should not exceed specified levels; areas that exceed the standard for specified pollutants are designated as "non attainment" areas. Six pollutants of primary concern were designated: ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxide (NO2), lead (Pb), and suspended particulate matter (PM_{10} and $PM_{2.5}$). In promulgating the NAAQs, the EPA allowed some states the option to develop stricter state standards. As such, California has adopted its own set of stricter standards under the California Clean Air Act (CCAA) of 1988.

This EIR focuses on pollutants for which the Bay Area is currently designated as a non-attainment area for the national standards (ozone) and state standards (ozone and particulate matter). Table 2.2-1 lists the federal and California ambient air quality standards for ozone, carbon monoxide and particulate matter. In addition, Table 2.2-2 presents a ten-year Bay Area air quality summary for days over the national and California standards for ozone, carbon monoxide, and particulate matter. Each of these criteria pollutants is discussed in more detail in the following pages.

Table 2.2-1: Ambient Air Quality Standards for Criteria Pollutants

Pollutant	*Averaging Time*	*California Standard*	*Bay Area Attainment Status for California Standard*	*Federal Primary Standard*	*Bay Area Attainment Status for Federal Standard*	*Major Pollutant Sources*
Ozone	8 hour	---	---	0.08 ppm	Non-Attainment	Motor vehicles, Other mobile sources, combustion, industrial and commercial processes
	1 hour*	0.09 ppm**	Non-Attainment	0.12 ppm	Non-Attainment	
Carbon Monoxide	8 hour	9.0 ppm	Attainment	9 ppm	Attainment	Internal combustion engines, primarily gasoline-powered motor vehicles
	1 Hour	20 ppm	Attainment	35 ppm	Attainment	
Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 $\mu g/m^3$	Non-Attainment	50 $\mu g/m^3$	Attainment	Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays)
	24 hour	50 $\mu g/m^3$	Non-Attainment	150 $\mu g/m^3$	Unclassified	
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 $\mu g/m^3$	Non-Attainment	15 $\mu g/m^3$	Unclassified	Same as above
	24 hour	---	---	65 $\mu g/m^3$	Unclassified	

*The national 1-hour standard will cease in June 2005 and be replaced with the more stringent 8- hour standard.

**PPM=parts per million; mg/m^3=milligrams per cubic meter; and $\mu g/m^3$=micrograms per cubic meter

Source: Bay Area Air Quality Management District, 2003; California Air Resource Board, 2003

Table 2.2-2: Ten-Year Bay Area Air Quality Summary (1994 to 2003)

Days Over Standard for Ozone, Carbon Monoxide and Particulate Matter (PM)

	Ozone			*Carbon Monoxide*			PM_{10}		$PM_{2.5}$	
Year	*1-Hr*		*8-Hr*	*1-Hr*		*8-Hr*	*24-Hr*[1]		*24-Hr*[2]	
	Nat'l	Calif.	Nat'l	Nat'l	Calif.	Nat'l	Calif.	Nat'l	Calif.	Nat'l
1994	2	13		0	0	0	0	0	9	
1995	11	28		0	0	0	0	0	7	
1996	8	34		0	0	0	0	0	3	
1997	0	8		0	0	0	0	0	4	
1998	8	29	16	0	0	0	0	0	5	
1999	3	20	9	0	0	0	0	0	12	
2000	3	12	4	0	0	0	0	0	7	7
2001	1	15	7	0	0	0	0	0	10	5
2002	2	16	7	0	0	0	0	0	6	7
2003	1	19	7	0	0	0	0	0	6	0

[1] PM_{10} is sampled every sixth day--actual days over standard can be estimated to be six times the numbers listed

[2] 2000 is the first full year of which the BAAQMD measured $PM_{2.5}$ levels

Nat'l = National, Calif.=California

Source: Bay Area Air Quality Management District, 2004

Ozone

Ozone (O_3) is a reactive pollutant, which is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and oxides of nitrogen (NO_X). ROG and NO_X are known as precursor compounds of ozone. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of ROG and NO_x that help to form ozone. Ozone is a regional air pollutant because it is formed downwind of sources of ROG and NO_X under the influence of wind and sunlight. During summertime (particularly on hot, sunny days with little or no wind), ozone levels are at their highest levels.

Short-term exposure to elevated concentrations of ozone is linked to such health effects as eye irritation and breathing difficulties. Repeated exposure to ozone can make people more susceptible to respiratory infections, and aggravate pre-existing respiratory diseases. Long-term exposures to ozone can cause more serious respiratory illnesses. Ozone also damages trees and other natural vegetation, reduces agricultural productivity, and causes deterioration of building materials, surface coatings, rubber, plastic products and textiles.

Ozone levels in the Bay Area have improved over the years. The previous national 1-hour ozone standard is being replaced with a new national 8-hour ozone standard, which averages ozone concentrations over a longer period of time. This new standard is believed to be more protective of public health. Table 2.2-3 and Table 2.2-4 present the number of exceedances of the national and state 1-hour ozone standard recorded at each Bay Area monitoring station, respectively. Figure 2.2-1 and Figure 2.2-2 plot the exceedances over a long time horizon (1965 to 2003). Table 2.2-5 displays the number of exceedances of the new national 8-hour ozone standard now in

place. It should be noted that the number of days on which the region experiences unhealthy ozone levels has fallen overall. This improvement is due to CARB regulations affecting motor vehicle emissions and Bay Area Air Quality Management District regulations to reduce emissions from industrial and commercial sources.

Carbon Monoxide

Carbon monoxide (CO) is an odorless and invisible gas. It is a non-reactive pollutant that is a product of incomplete combustion of gasoline in automobile engines. Carbon monoxide is a localized pollutant, and the highest concentrations are found near the source. Ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic and are influenced by wind speed and atmospheric mixing. Carbon monoxide concentrations are highest in flat areas on still winter nights, when temperature inversions trap the carbon monoxide near the ground. When inhaled at high concentrations, carbon monoxide reduces the oxygen-carrying capacity of the blood, which, in turn, results in reduced oxygen reaching parts of the body. Most of the Bay Area's carbon monoxide comes from on-road motor vehicles, although a substantial amount also comes from burning wood in fireplaces. Over the past 10 years, the Bay Area has not experienced any exceedances of either the national or state carbon monoxide standard.

Particulate Matter

Particulate matter includes dirt, dust, soot, smoke and liquid droplets found in the air. Coarse particulate matter, or PM_{10}, refers to particles less than or equal to 10 microns in diameter (about one-seventh the diameter of a human hair). PM_{10} is primarily composed of large particles such as dust from roads or black carbon (soot) from combustion sources. Fine particulate matter, or $PM_{2.5}$, refers to particles less than or equal to 2.5 microns in diameter, and contains particles formed in the air from primary gaseous emissions. Examples include sulfates formed from SO_2 emissions from power plants and industrial facilities, nitrates formed from NOx emissions from power plants, automobiles, and other combustion sources, and carbon formed from organic gas emissions from automobiles and industrial facilities. Coarse and fine particulate matter are small enough to get into the lungs and can cause numerous health problems, including respiratory conditions such as asthma and bronchitis, and heart and lung disease. People with heart or lung disease, the elderly, and children are at highest risk from exposure to particulate matter.

The Bay Area experiences its highest particulate matter concentrations in the winter, especially during evening and night hours. Major sources of PM_{10} include wood smoke, combustion of fossil fuels, and airborne dust propelled in the air by motor vehicles and construction, and diesel exhaust from trucks and buses. One third of total PM_{10} emissions come from woodburning largely during the winter, while another third comes from fossil fuels (particularly when winter conditions convert much more of the NOx produced into particulate ammonium nitrate)[2]. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect.

[2] Bay Area Air Quality Management District, Bay Area 2000 Clean Air Plan (December 2000)

Table 2.2-3: Days Exceeding the National 1-Hour Ozone Standard (1983 to 2003)

Station By Sub-Region	*83*	*84*	*85*	*86*	*87*	*88*	*89*	*90*	*91*	*92*	*93*	*94*	*95*	*96*	*97*	*98*	*99*	*00*	*01*	*02*	*03*
North Counties																					
Napa	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
San Rafael	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Rosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sonoma	0	0	0	0	0	0	0	0	0	0	0	0	0	+	+						
Vallejo	2	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Central Bay																					
Oakland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Richmond #	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
San Francisco	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Pablo ##															0	0	0	0	0	0	0
East District																					
Bethel Island	2	1	2	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0
Concord	4	3	1	0	3	1	0	0	0	0	2	0	3	1	0	2	2	1	1	0	0
Fairfield	0	1	0	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0
Livermore -Old First St[LO]	8	7	4	3	3	4	2	1	1	0	1	2	7	8	0	6	2	2			
Livermore –Rincon[LR]																		1	0	2	1
Pittsburg	2	1	1	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
South Bay																					
Fremont	7	5	4	2	4	1	0	1	0	0	1	0	2	0	0	0	1	0	0	0	0
Hayward	3	3	1	0	1	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0
Mountain View[MV]	5	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0				
Redwood City	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
San Leandro	3	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Santa Clara																					
Gilroy[Z]	5	3	2	0	4	1	2	0	1	0	0	0	1	0	0	2	0		0	0	0
Los Gatos	12	13	4	0	4	1	0	0	0	1	1	0	4	1	0	1	0	0	0	0	0
San Jose Central[SJ]	9	7	2	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0		0
San Jose, Piedmont	5	4	2	1	6	0	0	0	0	1	0	0	3	0	0	1	0	0	0	0	0
San Jose, San Carlos								1	0	0	1	0	***								
San Martin												1	1	0	0	3	1	0	0	0	0
Sunnyvale[SV]																			0	0	0
District Days	**21**	**22**	**8**	**5**	**14**	**5**	**4**	**2**	**2**	**2**	**3**	**2**	**11**	**8**	**0**	**8**	**3**	**3**	**1**	**2**	**1**

*** Closed April 1995; # Closed April 1997; ## Opened May 1997;

+ Out of service December 1996, closed permanently December 1997.

MV Mountain View closed 11/30/99; Z Gilroy closed for 2000; LR Livermore Rincon opened 12/1/99; LL Livermore Old 1st St Closed 12/31/00; SV Sunnyvale opened in 2001; SJ San Jose 4th St closed for relocation to Jackson St 6/1/02 to 10/1/02

Source: Bay Area Air Quality Management District, 2004

Table 2.2-4: Days Exceeding the State 1-Hour Ozone Standard (1985-2003)

Stations by Sub-Region	*85*	*86*	*87*	*88*	*89*	*90*	*91*	*92*	*93*	*94*	*95*	*96*	*97*	*98*	*99*	*00*	*01*	*02*	*03*
North Counties																			
Santa Rosa	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1
Sonoma	3	1	2	2	3	0	3	0	0	0	0	0							
Napa	3	0	6	1	2	0	3	0	2	0	4	0	0	3	4	0	1	1	2
Vallejo	5	0	6	5	2	2	2	1	3	2	6	5	1	3	4	0	0	1	2
San Rafael	1	0	1	1	0	0	0	0	0	0	0	2	1	0	2	0	0	0	0
Coast and Central Bay																			
San Francisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Richmond	0	0	0	2	1	0	0	0	2	0	0	0							
San Pablo													1	0	1	0	0	0	0
Oakland	1	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
South Central Bay																			
Fremont	8	3	17	7	11	3	6	5	5	4	10	2	2	7	3	2	3	3	4
Hayward**	5	1	12	9	1	0	2	1	0	1	7	2	2	4	4	1	2	0	3
Mountain View***	2	1	16	13	6	1	3	1	2	0	2	3	1	2	7				
San Leandro	0	0	0	0	0	0	2	2	3	0	6	2	3	2	3	1	0	1	2
Burlingame																			
Redwood City	5	1	2	2	1	0	0	0	1	0	5	1	0	0	0	0	1	0	1
Eastern District																			
Concord	10	5	20	10	6	3	4	3	7	4	9	11	2	13	8	2	6	5	5
Walnut Creek																			
Pittsburg	3	1	14	8	5	4	0	3	4	3	8	5	0	4	2	1	2	4	0
Bethel Island	8	8	14	7	11	5	3	7	3	5	6	6	1	10	5	1	3	5	0
Livermore	21	20	10	21	9	8	17	14	7	5	20	22	3	21	14	7	9	10	10
Fairfield	4	0	9	3	4	1	3	3	3	2	10	5	0	9	9	1	3	4	0
Santa Clara Valley																			
San Jose****	12	12	23	12	10	4	6	3	3	2	14	5	0	4	3	0	2		4
Los Gatos	20	21	25	12	1	5	7	3	8	2	13	10	1	5	4	0	2	4	7
San Jose East	16	5	22	13	9	1		5	5	3	15	5	1	5	2	1	0	0	2
Gilroy*	18	5	19	23	10	5	5	12	6	3	10	15	1	10	3		3	6	6
San Jose-Burbank						5	0	1	4	1									
San Martin										5	14	18	0	15	7	4	7	8	9
Sunnyvale																0	0	0	4
District Days	45	39	45	41	22	14	23	23	19	13	28	34	8	29	20	12	15	16	19

*Gilroy closed from 11/1/99 to 3/31/01

**Hayward Closed from 4/96 to 8/23/96

***Mountain View closed 12/3/99

****San Jose 4th St closed 4/30/02; reopened as San Jose Central 10/5/02

Source: Bay Area Air Quality Management District, 2004

Table 2.2-5: Days Exceeding the National 8-Hour Ozone Standard (1998-2003)

Site	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
North Counties						
Napa	1	1	0	0	0	0
San Rafael	0	0	0	0	0	0
Santa Rosa	0	0	0	0	0	0
Vallejo	0	1	0	0	0	0
Coast & Central Bay						
Oakland	0	0	0	0	0	0
San Francisco	0	0	0	0	0	0
San Pablo	0	0	0	0	0	0
Eastern District						
Bethel Island	5	5	1	2	3	0
Concord	6	6	1	1	3	1
Fairfield	3	4	0	0	0	0
Livermore	10	5	2	2	6	3
Pittsburg	1	1	0	1	2	0
South Central Bay						
Fremont	0	1	0	0	0	1
Hayward	0	1	0	1	0	1
Redwood City	0	0	0	0	0	0
San Leandro	0	0	0	0	0	0
Santa Clara Valley						
Gilroy	4	0		2	2	2
Los Gatos	2	1	0	1	2	2
Mountain View/Sunnyvale**	0	1		0	0	2
San Jose, 4th Street/Central*	1	0	0	0		0
San Jose East	0	0	0	0	0	0
San Martin	6	3	1	2	5	4

* San Jose 4th Street station was closed for relocation on April 30, 2002 and reopened as San Jose Central on October 5, 2002. Ozone statistics for 2002 have been omitted.

** Mountain View site was closed at the end of 1999. Sunnyvale site began operation in April 2001.

Source: Bay Area Air Quality Management District, 2004

Figure 2.2-1: Exceedances of the National 1-Hour Ozone Standards in the Bay Area (1965 - 2003)

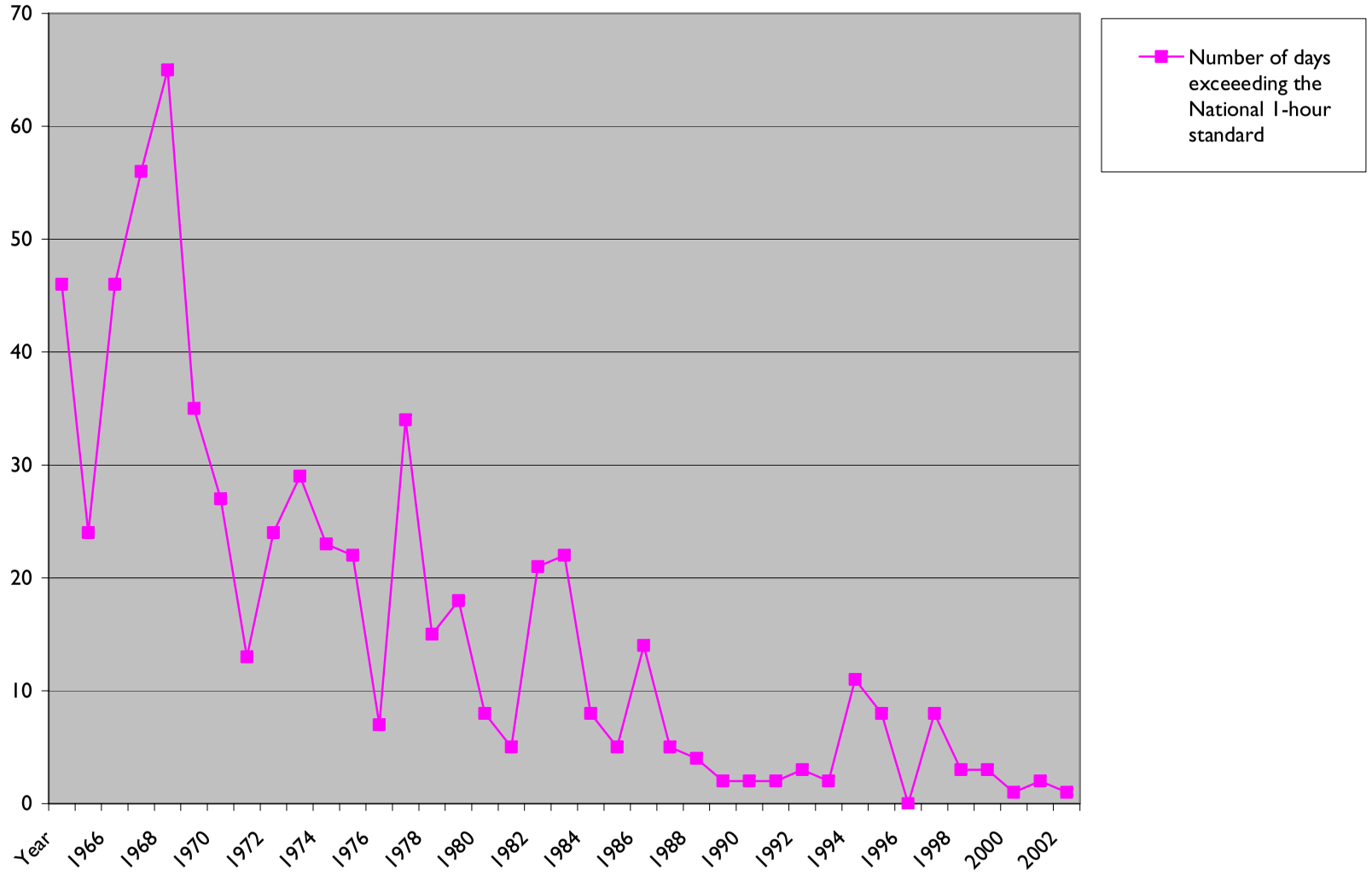
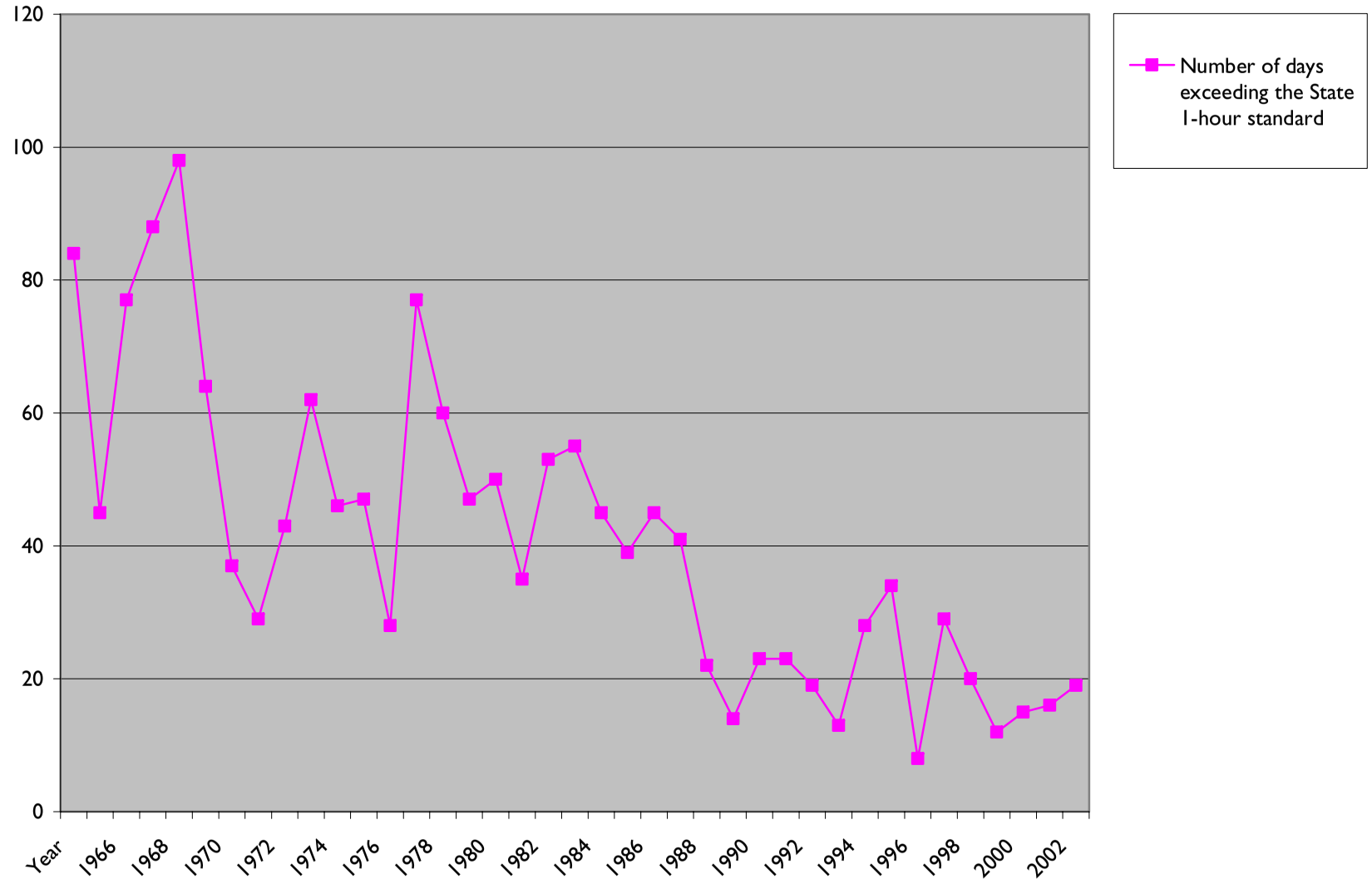


Figure 2.2-2: Exceedances of the State 1-Hour Ozone Standards in the Bay Area (1965 - 2003)



Non-Criteria Pollutants

Toxic Air Contaminants

Toxic Air Contaminants (TACs) are a set of non-criteria pollutants. Although this EIR does not focus on non-criteria pollutants, this discussion of TACs is included as an informational item. TACs are emitted daily by industrial and chemical manufacturing processes, commercial activities, refinery operations, gasoline marketing and motor vehicles. Toxic air contaminants are formed from the combustion of other chemicals and are present in exhaust from motor vehicles and buses. Exposure to airborne toxic compounds has been linked to a higher risk of cancer. According to the Bay Area Air Quality Management District, approximately 75 percent of the total ambient air risk is from diesel particulate matter (which was identified by CARB as TACs), and 90 percent of total ambient air risk is from mobile sources (diesel particulate matter, benzene and 1,3-butadiene). The average ambient levels of benzene dropped significantly in 1996 due to the widespread introduction of Phase 2 reformulated gasoline. The network average benzene level has continued to drop, and by the end of 2002, the benzene level had decreased to 42 percent of what was observed in 1995[3].

Control measures already adopted by CARB, such as the Low-Emissions Vehicles/Clean Fuels (LEV) program and requirements for utility engines and off-road vehicles/engines, should provide gradual reductions in emissions of benzene and 1,3-butadiene in the future. In addition, CARB's Diesel Risk Reduction Plan will significantly reduce diesel particulate matter emissions through cleaner fuels (e.g., Ultra-Low Sulfur Diesel), tighter diesel tailpipe regulations and regulations governing operations (e.g., idling restrictions)[4]. Similarly, the Bay Area Air Quality Management District's newly initiated Community Air Risk Evaluation (CARE) program will look at all toxic air pollutants with an emphasis on diesel exhaust in areas with the highest health risk. The CARE program includes enhanced air monitoring that will better determine the relative contribution of air pollution sources, and a cumulative risk assessment for stationary sources within selected communities. Such programs will help reduce toxic pollutants in areas with the highest risk through regulatory controls and incentives.

REGULATORY SETTING

Air Pollution Control Agencies

The MTC region encompasses the San Francisco Bay Air Basin in its entirety and portions of both the North Coast Air Basin and the Sacramento Valley Air Basin. Northern Sonoma County is within the North Coast Air Basin, while eastern Solano County is within the Sacramento Valley Air Basin. (Both southern Sonoma County and western Solano County are within the San Francisco Bay Air Basin.)

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[3] Ibid.
[4] California Air Resources Board, Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (October 2000)

The Bay Area Air Quality Management District (BAAQMD) governs the San Francisco Bay Air Basin, while the Northern Sonoma County Air Pollution Control District (NSCAPCD) governs the North Coast Air Basin and the Yolo-Solano Air Pollution Control District (YSAPCD) governs the Sacramento Valley Air Basin portion that corresponds to MTC's jurisdiction. The geographic boundaries of these air basins and air districts are shown in Figure 2.2-3. In California, air pollution control districts generally follow county boundaries. In the more urban areas, county agencies were merged by state legislation into unified air quality management districts.

Federal Regulations

Federal Ozone Requirements and Attainment Status

National 1-Hour Ozone Standard

In 1979, EPA promulgated the current ozone standard, 0.12 parts per million (ppm), which is measured over a one hour period (i.e., the national 1-hour ozone standard). This standard addresses peak concentrations of ozone typically seen in urban areas.

Until recently, the Bay Area has violated the national 1-hour ozone standard[5]. For the past three years (2001, 2002, and 2003), no ozone monitoring station registered more than three exceedances of the national 1-hour ozone standard. Only three stations recorded exceedances, and only Livermore recorded more than one. Because data for three complete, consecutive calendar years show that all locations within the region have met the national 1-hour ozone standard, the Bay Area, by definition, has attained the national 1-hour ozone standard. In April 2004, EPA made a final finding that the Bay Area had attained the national 1-hour ozone standard.

The finding of attainment does not mean the Bay Area has been reclassified as an attainment area for the 1-hour standard. The region must submit a redesignation request to EPA in order to be reclassified as an attainment area. The BAAQMD, MTC, and ABAG are currently preparing the Draft Bay Area 2004 Ozone Strategy to address national and state ozone planning requirements. The Ozone Strategy will be released for public review in fall 2004. The national portion of the Ozone Strategy will include: (1) a redesignation request that explains how the region satisfies all applicable requirements to become an attainment area, and (2) a maintenance plan to show the region will continue to meet the 1-hour ozone standard in the future.

National 8-Hour Ozone Standard

In 1997, EPA revised the ozone standard, setting it to 0.08 ppm and defined the new standard as a "concentration-based" form, specifically the 3-year average of the annual 4th-highest daily maximum 8-hour ozone concentrations. The implementation of the 8-hour standard was delayed because EPA was challenged in court by a number of industry groups. In April 2004, EPA issued final designations for areas as attaining or not attaining the national 8-hour ozone standard.

[5] In August 1998, EPA designated the Bay Area as an ozone non-attainment area due to violations of the national 1-hour ozone standard in 1995 and 1996.

Figure 2.2-3

Bay Area Air Quality Management District Boundaries

Air Quality Management District Boundaries, Teale GIS Solutions Group, 1990.

The Bay Area monitoring stations recorded concentrations that exceeded the national 8-hour ozone standard for 1997, 1998, and 1999. In March 2000, the CARB recommended a nonattainment designation for the Bay Area for the national 8-hour ozone standard. In April 2004, EPA formally designated the Bay Area as a nonattainment area for the national 8-hour ozone standard, and classified the region as "marginal" based on five classes of nonattainment areas for ozone, ranging from marginal to extreme. The Bay Area must submit a State Implementation Plan (SIP) to EPA by June 2007 that demonstrates attainment of the national 8-hour ozone standard. EPA will revoke the national 1-hour ozone standard in June 2005; however, EPA expects continued compliance with the national 1-hour ozone standard until an area demonstrates attainment of the national 8-hour ozone standard.

Federal Carbon Monoxide Requirements and Attainment Status

In August 1998, the Bay Area was redesignated to attainment for the national 8-hour carbon monoxide standard, having demonstrated attainment of the standards. The region must assure continued attainment of the CO standard.

Federal Particulate Matter Requirements and Attainment Status

In 1971, EPA promulgated the original primary and secondary national standards for particulate matter. In 1987, recognizing the risks of adverse health effects associated with smaller particles that are more likely to penetrate deeper into the respiratory system, EPA created the PM_{10} standard. However, EPA concluded that the continued use of PM_{10} as the sole indicator for particulate matter would not provide the most effective protection from the detrimental health effects of small particulate matter. In July 1997, EPA revised the PM_{10} standard and created a new $PM_{2.5}$ standard, which addresses particles whose size is 2.5 microns or less. After resolution of legal challenges, EPA began developing new strategies for implementation of the $PM_{2.5}$ standards.

The Bay Area is designated as attainment for the national PM_{10} standard. As of February 2004, the CARB has forwarded a recommendation to EPA that the Bay Area be designated as unclassified for the national $PM_{2.5}$ standard due to insufficient air quality data to make a determination.

Federal Transportation Conformity Requirements

The 1990 CAAA outlines requirements for ensuring that federal transportation plans, programs and projects "conform" to the State Implementation Plan's (SIP) purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards. The EPA subsequently published conformity regulations to implement the 1990 CAAA conformity requirements in November 1993, and revised them in August 1995, November 1995 and August 1997. Metropolitan Planning Organizations such as MTC are required to adopt and follow these regulations. MTC Resolution No. 3075 is the MTC resolution adopting EPA's most current regulation on conformity procedures for plans, programs and projects. These same conformity requirements are also adopted by ABAG and the BAAQMD.

These regulations and resolutions state, in part, that MTC cannot approve any transportation plan, program or project unless these activities conform to the purpose of the State Implementation Plan. "Transportation plan" refers to the RTP. "Program" refers to the Transportation Improvement Program (TIP), which is a financially realistic set of highway and

transit projects to be funded over the next six years. A "transportation project" is any highway or transit improvement, which is included in the RTP and TIP and requires funding or approval from the Federal Highway Administration or the Federal Transit Administration.

To demonstrate conformity of a Plan or TIP, MTC conducts a conformity analysis to show that estimated total motor vehicle emissions are lower than the allowed amount in the SIP and that adopted Transportation Control Measures in the SIP are being implemented in a timely manner (there are currently five adopted federal TCMs that have been or are being implemented as shown in Table 2.2-6).

The federal conformity analysis and findings are addressed in a separate process from the EIR and, under EPA regulations, includes extensive requirements for consultation with transportation and air quality agencies and the public. The results of the federal conformity analysis will be included by reference in the final Transportation 2030 Plan and the 2005 Transportation Improvement Program with Amendment #05-05. See MTC's web page, www.mtc.ca.gov, for more information about the Air Quality Conformity Task Force meetings and materials related to the federal conformity analysis.

Table 2.2-6: Five New Transportation Control Measures in State Implementation Plan (2001 Ozone Attainment Plan)

TCM #	*Title*
TCM A	Regional Express Bus Program
TCM B	Bicycle/Pedestrian Program
TCM C	Transportation for Livable Communities (TLC) Program
TCM D	Expansion of Freeway Service Patrol
TCM E	Transit Access to Airports

Source: Bay Area Air Quality Management District, 2004

State Regulations – State Requirements and Attainment Status

The California Air Resources Board (CARB) has established a state, health-based air quality standard for ozone at a level of 0.09 parts per million (ppm) for a one-hour average, significantly more stringent than the national standard of 0.12 ppm. Under the California Clean Air Act (CCAA) of 1988, areas not complying with the standard must prepare plans to reduce ozone. Non-compliance with the state ozone standard does not impact the ability to proceed with any transportation plan, program, or project. At this time, no major metropolitan area in the state complies with the state ozone standard. The first Bay Area Clean Air Plan (CAP) was adopted in 1991, and updates to the CAP have occurred in 1994, 1997, and most recently, 2000. The CAP is currently being updated by the BAAQMD to ensure the state Plan contains "all feasible measures" (a draft 2004 Ozone Strategy will be released in late 2004).

The CCAA of 1988 requires a reduction in district wide emissions of 5 percent per year for each non-attainment pollutant or its precursors. If a district is unable to achieve this reduction, it allows, as an alternative strategy, the implementation of all feasible measures on an expeditious schedule. The Bay Area has proceeded under the latter requirement. The CCAA states that attainment plans should emphasize reducing emissions from transportation and areawide sources. It requires air districts to adopt, implement, and enforce various stationary, mobile

source and transportation control measures to reduce emissions. Transportation control measures (TCMs) are defined in State law as any strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions. The draft TCMs proposed for the Draft Bay Area 2004 Ozone Strategy consists of 19 measures, as shown in Table 2.2-7.

The Bay Area attained the state carbon monoxide (CO) standard in 1993, so the CCAA planning requirements for CO nonattainment areas no longer apply to the Bay Area.

The Bay Area does not attain the state PM_{10} or $PM_{2.5}$ standards, which are much stricter than the national PM_{10} standards. However, at this time the CCAA does not include any planning requirements for PM_{10} or $PM_{2.5}$ non-attainment areas, so no attainment plan has been developed for this pollutant.

Table 2.2-7: Transportation Control Measures Proposed in Draft Bay Area 2004 Ozone Strategy

#	*Title*
TCM 1	Voluntary Employer Based Trip Reduction Programs
TCM 3	Improve Local and Areawide Bus Service
TCM 4	Improve Regional Rail Service
TCM 5	Improve Access to Rail and Ferries
TCM 6	Improve Interregional Rail Service
TCM 7	Improve Ferry Service
TCM 8	Construct Carpool/Express Bus Lanes on Freeways
TCM 9	Improve Bicycle Access and Facilities
TCM 10	Youth Transportation
TCM 11	Install Freeway Traffic Management System
TCM 12	Arterial Management Measures
TCM 13	Transit Use Incentives
TCM 14	Carpool and Vanpool Services and Incentives
TCM 15	Local Land Use Planning and Development Strategies
TCM 16	Public Education/Intermittent Control Measures
TCM 17	Conduct Demonstration Projects
TCM 18	Transportation Pricing Reform
TCM 19	Improve Pedestrian Access and Facilities
TCM 20	Promote Traffic Calming

Source: Bay Area Air Quality Management District, 2004

Relationship Between RTP-Level and Project-Level Emissions

The air quality impacts discussed in this EIR are for the proposed Transportation 2030 Plan as a whole and are regional in nature. This EIR does not examine localized air quality effects of specific transportation improvements in the Transportation 2030 Plan, such as concentrations of carbon monoxide and particulate matter. These pollutants will be examined in subsequent project-level EIRs prepared by project sponsors in order to approve the individual projects. It is further possible that individual transportation improvements could result in short-term

construction-related emissions, due to use of certain types of equipment and the rerouting traffic, such that traffic and emissions increase in some locations when compared to 2000 existing conditions or the No Project alternative.

IMPACT ANALYSIS

SIGNIFICANCE CRITERIA

According to the State CEQA Guidelines, significant impacts to air quality would occur if the plan would conflict with or obstruct implementation of the applicable air quality attainment plan; violate any air quality standard or contribute to an existing or projected air quality violation; or result in a cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors). The most straightforward means to assess these potential impacts is to evaluate overall mobile source emission trends.

The following criterion was used to assess whether proposed improvements in the Transportation 2030 Plan would have a significant adverse effect on air quality for criteria air pollutants:

- **Criterion 1: Motor vehicle emissions are higher for the proposed Transportation 2030 Plan than for the No Project alternative.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant impact if motor vehicle emissions for criteria pollutants ROG, NO_X, PM_{10}, $PM_{2.5}$, and CO are higher for the proposed Project (Transportation 2030 Plan) than for the No Project alternative.

For the purposes of addressing cumulative impacts in CEQA, it is considered a significant cumulative impact if future mobile source emissions are higher than existing and the increase in emissions is primarily related to travel demand increases due to regional growth.

METHOD OF ANALYSIS

Projected vehicle emissions for each of the criteria pollutants (ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$) for the Proposed Project were compared to existing conditions (2000) and to the No Project alternative.

The air quality analysis is based on the forecasts of travel behavior and vehicle activity from MTC's travel demand forecasting models. These models have been extensively reviewed and refined in connection with their application to air quality analyses of various kinds. Key model outputs for use in air quality analyses include: total daily vehicle trips, vehicle miles of travel, and distribution of vehicle miles of travel by speed. This information is then used in determining total emissions from transportation activity in the Bay Area using motor vehicle emission models developed and maintained by the CARB.

In particular, the CARB is responsible for developing updated vehicle emission rates based on the latest testing of in-use vehicles. The latest on-road motor vehicle emissions model developed by CARB is called EMFAC2002 (version 2.2, April 23, 2003). The EMFAC2002 model includes two basic modules: emission factors and vehicle activity. Emission factors describe the emission

characteristics of vehicles under different ambient and driving conditions. CARB develops these factors based on thousands of emissions tests on both new and used vehicles recruited randomly from the California fleet. Emission factors are held constant in the model. Within the EMFAC2002 model, these emission factors are combined with vehicle activity, or estimates of travel and vehicle demographics, provided by MTC through its travel demand forecasting models as well as Department of Motor Vehicles (DMV) vehicle registration data. Expected emission reductions resulting from California's Inspection and Maintenance (called "Enhanced Smog Check" in the Bay Area) program are accounted for within EMFAC2002.

Emission estimates for ROG, NOx, CO and particulate matter (associated with engine exhaust and tire wear) are direct outputs from the EMFAC2002 model. To obtain rough estimates of the amount of particulate matter generated by autos kicking up dust from Bay Area roads (called "entrained dust"), regional vehicle miles of travel were multiplied by the following factors: (1) 0.458 grams/mile entrained dust for $PM_{10,}$ and (2) 0.077 grams/mile entrained dust for $PM_{2.5}$.

FUTURE TRANSPORTATION CONDITIONS (2003)

Table 2.2-8 provides the core 2030 travel activity data used to calculate regional motor vehicle emissions.

Table 2.2-8: Travel Data

				Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
	2000	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
Vehicles in Use	4,781,500	7,227,700	7,143,300	2,446,200	49.4%	-84,400	-1.2%
Daily Vehicle Miles Traveled (VMT)	143,495,300	203,072,600	200,878,200	57,382,900	40%	2,194,400	-1%
Engine Starts	32,053,000	45,712,000	45,167,000	13,114,000	40.9%	-545,000	-1.2%
Total Population	6,783,762	8,780,300					
Total Employment	3,753,670	5,226,400					

Source: Metropolitan Transportation Commission, 2004

SUMMARY OF IMPACTS

Projected vehicle emissions in the Project alternative for ROG, NOx, and CO will substantially decrease when compared to existing conditions (2000) and No Project alternative (see Table 2.2-9). This is considered a beneficial impact. This decrease is largely due to the retirement of older, more polluting automobiles, increases in the number of newer and less polluting autos, and implementation of increasingly more stringent emissions controls on future engines and fuels as developed by CARB. While projected vehicle emissions for PM_{10} and $PM_{2.5}$ will increase compared to existing conditions (due to growth in vehicle miles traveled and generation of road dust), the Proposed Project will produce fewer PM emissions than the No Project alternative. Therefore, relative to the criterion of significance, the implementation of the Proposed Project will have no significant air quality impacts when compared to the No Project alternative.

IMPACTS & MITIGATION

Motor Vehicle Emissions

Impact

2.2-1 The Proposed Project would result in reductions in ROG, NOx and CO emissions. *(Beneficial)*

As shown in Table 2.2-9, the emissions for criteria pollutants ROG, NOx, and CO would decrease substantially between 2000 and the 2030 horizon for the Proposed Project. The major reason for this decrease in emissions is turnover in autos, whereby older polluting cars are retired and replaced with newer and substantially less polluting cars. These trends reflect the stringent emission controls CARB has adopted for new vehicle engines and fuels.

Table 2.2-9: Emission Estimates for Criteria Pollutants using EMFAC2002 Factors (tons per day)

				Change 2000 to 2030 Project		*Change 2030 No Project to 2030 Project*	
	2000	*2030 No Project*	*2030 Project*	*Numerical*	*Percent*	*Numerical*	*Percent*
ROG	214.7	38.1	37.4	-177.2	-82.6%	-0.7	-1.8%
NOx	363.4	55.5	54.6	-308.8	-85.0%	-0.9	-1.6%
CO	2,279.6	297.3	290.2	-1989.5	-87.3%	-7.2	-2.4%
PM_{10}	93.9	128.2	126.5	32.6	34.7%	-1.7	-1.3%
$PM_{2.5}$	21.1	26.9	26.4	5.3	25.1%	-0.5	-1.8%

Source: Metropolitan Transportation Commission, 2004

Mitigation Measures

Not applicable as this is a beneficial impact.

Impact

2.2-2 Emissions impacts of the proposed Project for all criteria pollutants (ROG, NOx, CO, PM_{10} and $PM_{2.5}$) are lower than the No Project's emissions. *(Adverse, but not significant)*

Proposed Project emissions for PM_{10} and $PM_{2.5}$ would increase by 34.7 percent and 25.1 percent, respectively, compared to existing conditions (2000). This is due to the fact that these emissions are strongly influenced by the growth in vehicle miles of travel, with lesser contributions from tire and brake wear and exhaust. However, the Proposed Project would produce less emissions for all criteria pollutants (ROG, NOx, CO, and PM_{10} and $PM_{2.5}$) compared to the No Project alternative. The most substantial emission decrease would occur in CO with a 2.4 percent decrease, followed by a 1.8 percent decrease for ROG, and 1.6 percent decrease for NOx. In addition, emissions in the Project alternative for both PM_{10} and $PM_{2.5}$ will be reduced by 1.3 percent and 1.8 percent, respectively, compared to the No Project.

Mitigation Measures

No mitigation measures are required as there is no significant impact from the implementation of the proposed Transportation 2030 Plan.

Cumulative Impact

2.2-3 PM_{10} and $PM_{2.5}$ emissions are projected to increase substantially over existing conditions (2000) due to projected cumulative regional growth and the attendant increase in travel. ***(Significant, potentially mitigable, but strategies not defined)***

Proposed Project emissions for PM_{10} and $PM_{2.5}$ would increase by 34.7 percent and 25.1 percent, respectively, compared to existing conditions (2000). This is because they are strongly influenced by growth in vehicle miles of travel that inevitably increases with population and job growth. As shown in Table 2.2-8, by 2030, population growth in the Bay Area is expected to increase by 29.4 percent from existing conditions (2000), and average daily vehicle miles traveled is expected to grow by 40 percent from existing conditions

Mitigation Measures

2.2(a) If attainment plans are required for PM_{10} and $PM_{2.5}$ in the future, the BAAQMD, MTC, and ABAG (co-lead agencies for air quality planning) will identify the magnitude of reduction required from motor vehicles as well as appropriate control measures to address PM from on road dust and other sources. The extent of the reduction potential is not presently known; therefore, it is not possible to determine whether the impact is partially or fully mitigable.

2.3 Land Use, Housing, and Social Environment

The San Francisco Bay Area has grown from the sparsely populated Native American and then Spanish settlements of the past to an urban area of nearly seven million people today. The pattern of land use in the Bay Area runs from one of the most densely populated urban centers in the United States (the City of San Francisco) to open hills and shorelines, and from growing suburban areas to highly valued farming areas.

This chapter evaluates the potential effects of the transportation projects in the proposed Transportation 2030 Plan on the land use, housing, and social environment of the Bay Area. It describes trends in use of land for residential and employment purposes and trends in the density of new development projected by the Association of Bay Area Governments, based on their review of local general plans, Local Policy Surveys, and smart growth principles developed through the Bay Area Region's Smart Growth Project. In addition, it describes the projected housing trends for the Bay Area between now and 2030. It then addresses the potential impacts of the proposed Transportation 2030 Plan on the conversion or loss of important agricultural lands, open space, or natural areas; project consistency with adopted land use plans; community displacement and disruptions, including potential loss of housing and businesses and separation of people from community resources; and project influences on future land use and development decisions (based on changes to access and mobility).

ENVIRONMENTAL SETTING

PHYSICAL SETTING

The physical land use setting includes current and projected land use patterns, urban development trends and densities, land use accessibility and agricultural uses, and housing.

Land Use Patterns

Since World War II, the San Francisco Bay Area has grown from a primarily agricultural region with one major city (San Francisco) to the fifth most (Census 2000) populous metropolitan region in the United States with multiple centers of employment, residential development, and peripheral agricultural areas. The pattern of land uses in the Bay Area includes a mix of open space, agriculture, intensely developed urban centers, a variety of suburban employment and residential areas, and scattered older towns. This pattern reflects the landforms that physically define the region, the Bay, rivers, and valleys. Major urban areas are located around the Bay, with the older centers close to the Golden Gate. Newer urban areas are found in Santa Clara County to the south, the valleys of eastern Contra Costa and Alameda Counties, and Sonoma and Solano Counties to the north.

The Pacific coast and the northern valleys are primarily in agricultural and open space use, while the agricultural areas adjoining the Central Valley have seen substantial suburban development in recent years, particularly in Solano County and eastern Contra Costa County.

Extent of Urban Development

The Bay Area is comprised of nine counties, including Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma. According to ABAG, only about 18 percent (ABAG, 2003) of the region's approximately 7,000 square miles is developed). The remaining undeveloped area includes open space and agricultural lands as well as water bodies (excluding the San Francisco Bay) and parks.

The amount of land developed in each of the nine counties varies from a low of four and a half percent in Napa County to a high of 51 percent in San Francisco. Residential uses continue to consume the greatest amount of urban land, 72 percent, while employment related land uses occupy about 28 percent (ABAG, 2003). Streets, highways, sidewalks, and parking consume about 20 percent of the land in each category, and accordingly, about 20 percent of the developed land in the Bay Area.

The Bay Area includes 101 cities, of which three cities—San Jose, San Francisco, and Oakland—represent the largest urbanized centers. Other major urban centers have formed throughout the region leading to the urbanization illustrated in Figure 2.3-1.

Density of Development

Residential and employment densities vary widely among the areas of the region, with the highest densities associated with the older areas. Densities are of interest because of the way that they affect transportation options for Bay Area residents. Low density development by definition is more dispersed requiring greater reliance on autos for many trips, while higher residential densities on the order of 7.0 to 30.0 units/acre can sustain significant transit service (Pushkarev, and Zupan, 1977). A density of 8.0 units/acre is sometimes cited as the minimum density required to economically justify a fixed bus system operating at half hour headways (Cervero, 1986).

Average existing densities are shown for the MTC superdistricts in Table 2.3-1[1] and for counties in Table 2.3-2. The Bay Area averages for residential and employment density are 4 units per residential acre and 16 jobs per commercial or industrial acre. The highest residential and employment densities occur in downtown San Francisco (which includes the North Beach and Chinatown neighborhoods) with 125 households per residential acre and 277 jobs per commercial or industrial acre.

[1] MTC divides the Bay Area into 34 superdistricts. These superdistricts are comprised of 1,454 transportation analysis zones (TAZ) used as areas of aggregation for Bay Area population and employment levels, and for analysis, calibration, and presentation of MTC's transportation model (BAYCAST-90) output.

With respect to residential uses, after San Francisco, the Berkeley/Albany, Daly City/San Bruno, and Sunnyvale/Mountain View areas have the highest densities, while Healdsburg/Cloverdale, Santa Rosa/Sebastopol, and St. Helena/Calistoga have the lowest densities. Areas with the highest employment densities include San Francisco, Palo Alto/Los Altos, Berkeley/Albany, and Walnut Creek/Lamorinda. Areas with the lowest employment densities include Healdsburg/Cloverdale, Fairfield/Vacaville, and Antioch/Pittsburg.

At the county level, with the exception of San Francisco County, the highest employment densities occur in Santa Clara and San Mateo counties, while the highest residential densities occur in Alameda and Santa Clara counties. The lowest residential densities can be found in Sonoma County; the lowest employment densities in Solano County. Figure 2.3-2 illustrates existing population density in the region.

Land Use and Future Densities

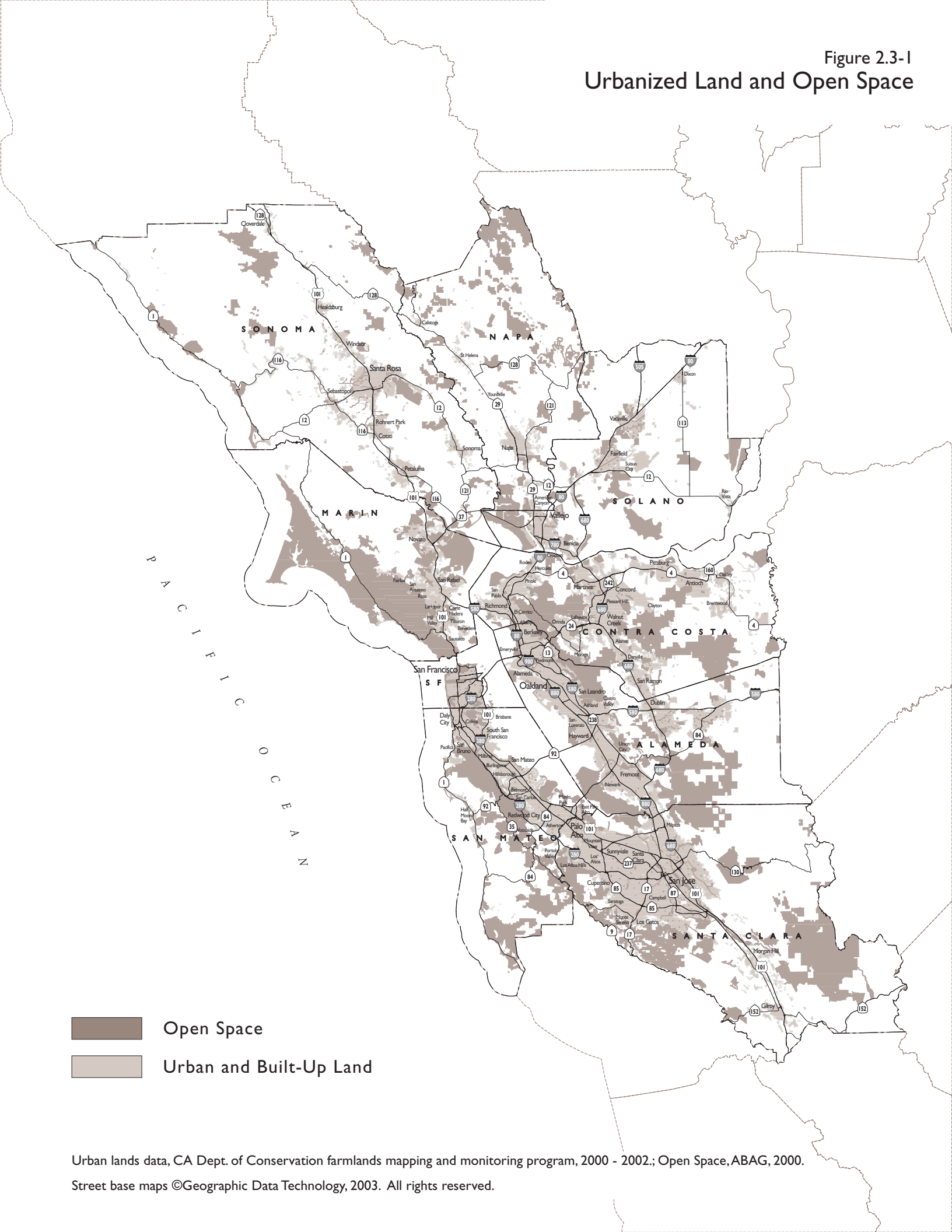
The percent of land that is developed is forecast to increase by 71,482 acres between 2000 and 2030, an increase of 9 percent (ABAG, 2003). This regional development will result in just over 19 percent of all Bay Area land being developed by 2030.

Overall regional population density has decreased by a small amount in the last 10 years, but is projected to increase steadily over the next 25 years, ranging from 11.6 to 13.5 persons per residential acre. Projected population density for year 2030 is illustrated in Figure 2.3-3. The regional household density on the other hand, has remained fairly constant, decreasing only slightly in the last 10 years. Household density is projected to reach about 5 households per acre in 2030.

The projection of constant residential density is the result of two countervailing trends. New residential development on new residential acreage (currently undeveloped acreage) is projected to be developed at densities lower than the regional average, perhaps as low as 3.5 units per acre. However, a considerable amount of infill residential development is also occurring within major cities at very high densities. At least 25 percent of the new housing units in the Bay Area are forecast to be provided without any increase in developed acreage. This infill development within the established cities will contribute to greater transit use in the established core where transit is successful. Table 2.3-3 summarizes this information.

Figure 2.3-1

Urbanized Land and Open Space



Urban lands data, CA Dept. of Conservation farmlands mapping and monitoring program, 2000 - 2002.; Open Space, ABAG, 2000.

Table 2.3-1: Year 2000 Density of Development in the Bay Area by MTC Superdistrict

		Employment Density			*Residential Density*		
	Superdistrict	*Jobs*	*Commercial/ Industrial Acres*	*Density*	*Households*	*Residential Acres*	*Density*
1	Downtown San Francisco	386,582	1,396	276.9	68,139	547	124.6
2	Richmond District	81,534	969	84.1	102,163	2,259	45.2
3	Mission District	138,115	3,069	45.0	110,434	4,025	27.4
4	Sunset District	28,216	438	64.4	48,961	2,540	19.3
5	Daly City/San Bruno	163,295	8,545	19.1	96,371	9,945	9.7
6	San Mateo/Burlingame	111,981	4,942	22.7	80,400	16,715	4.8
7	Redwood City/Menlo Park	120,629	9,642	12.5	77,333	34,320	2.3
8	Palo Alto/Los Altos	179,489	4,404	40.8	68,068	17,931	3.8
9	Sunnyvale/Mountain View	372,465	17,013	21.9	88,679	10,992	8.1
10	Saratoga/Cupertino	145,643	5,234	27.8	116,842	28,375	4.1
11	Central San Jose	161,034	5,709	28.2	92,049	12,404	7.4
12	Milpitas/East San Jose	120,309	6,354	18.9	99,420	18,948	5.2
13	South San Jose/Almaden	71,208	3,134	22.7	71,320	14,928	4.8
14	Gilroy/Morgan Hill	42,200	2,957	14.3	29,484	13,779	2.1
15	Livermore/Pleasanton	119,075	9,100	13.1	60,487	20,655	2.9
16	Fremont/Union City	145,557	10,310	14.1	99,510	18,923	5.3
17	Hayward/San Leandro	163,593	12,115	13.5	122,610	21,540	5.7
18	Oakland/Alameda	216,170	13,750	15.7	172,049	18,629	9.2
19	Berkeley/Albany	107,279	3,413	31.4	68,709	5,881	11.7
20	Richmond/El Cerrito	76,291	8,308	9.2	85,492	11,616	7.4
21	Concord/Martinez	104,518	12,382	8.4	83,827	15,800	5.3
22	Walnut Creek/Lamorinda	82,823	2,727	30.4	59,110	19,317	3.1
23	Danville/San Ramon	53,803	2,274	23.7	41,471	16,821	2.5
24	Antioch/Pittsburg	43,670	10,030	4.4	74,229	16,495	4.5
25	Vallejo/Benicia	43,881	6,608	6.6	50,961	7,752	6.6
26	Fairfield/Vacaville	79,330	18,550	4.3	79,442	34,737	2.3
27	Napa	41,453	2,601	15.9	31,209	7,586	4.1
28	St. Helena/Calistoga	25,381	2,182	11.6	14,193	10,272	1.4
29	Petaluma/Sonoma	61,085	11,047	5.5	60,448	38,637	1.6
30	Santa Rosa/Sebastopol	123,534	9,515	13.0	82,438	58,457	1.4
31	Healdsburg/Cloverdale	20,602	11,796	1.7	29,517	45,721	0.6
32	Novato	27,878	2,414	11.5	21,176	6,733	3.1
33	San Rafael	52,911	4,319	12.3	41,527	14,497	2.9
34	Mill Valley/Sausalito	42,175	1,919	22.0	37,947	9,115	4.2

Note: information in this table was based on MTC's Superdistrict data.

Source: MTC Superdistrict and County Summaries of ABAG's Projections 2003 2000-2030 Data Summary, 2003

Table 2.3-2: Density of Development in the Bay Area by County

	Employment Density			*Residential Density*		
County	*Jobs*	*Commercial/ Industrial Acres*	*Density*	*Households*	*Residential Acres*	*Density*
Alameda	751,674	48,688	15.4	523,365	85,628	6.1
Contra Costa	361,105	35,721	10.1	344,129	80,049	4.3
Marin	122,964	8,652	14.2	100,650	30,345	3.3
Napa	66,834	4,783	14.0	45,402	17,858	2.5
San Francisco	634,447	5,872	108.0	329,697	9,371	35.2
San Mateo	395,905	23,129	17.1	254,104	60,980	4.2
Santa Clara	1,092,348	44,805	24.4	565,862	117,357	4.8
Solano	123,211	25,158	4.9	130,403	42,489	3.1
Sonoma	205,221	32,358	6.3	172,403	142,815	1.2
Bay Area	***3,753,709***	***229,166***	***16.4***	***2,466,015***	***586,892***	***4.2***

Note: information in this table was based on MTC's Superdistrict data.

Source: MTC Superdistrict and County Summaries of ABAG's Projections 2003 2000-2030 Data Summary, 2003

Figure 2.3-2

Existing Population Density (2000)

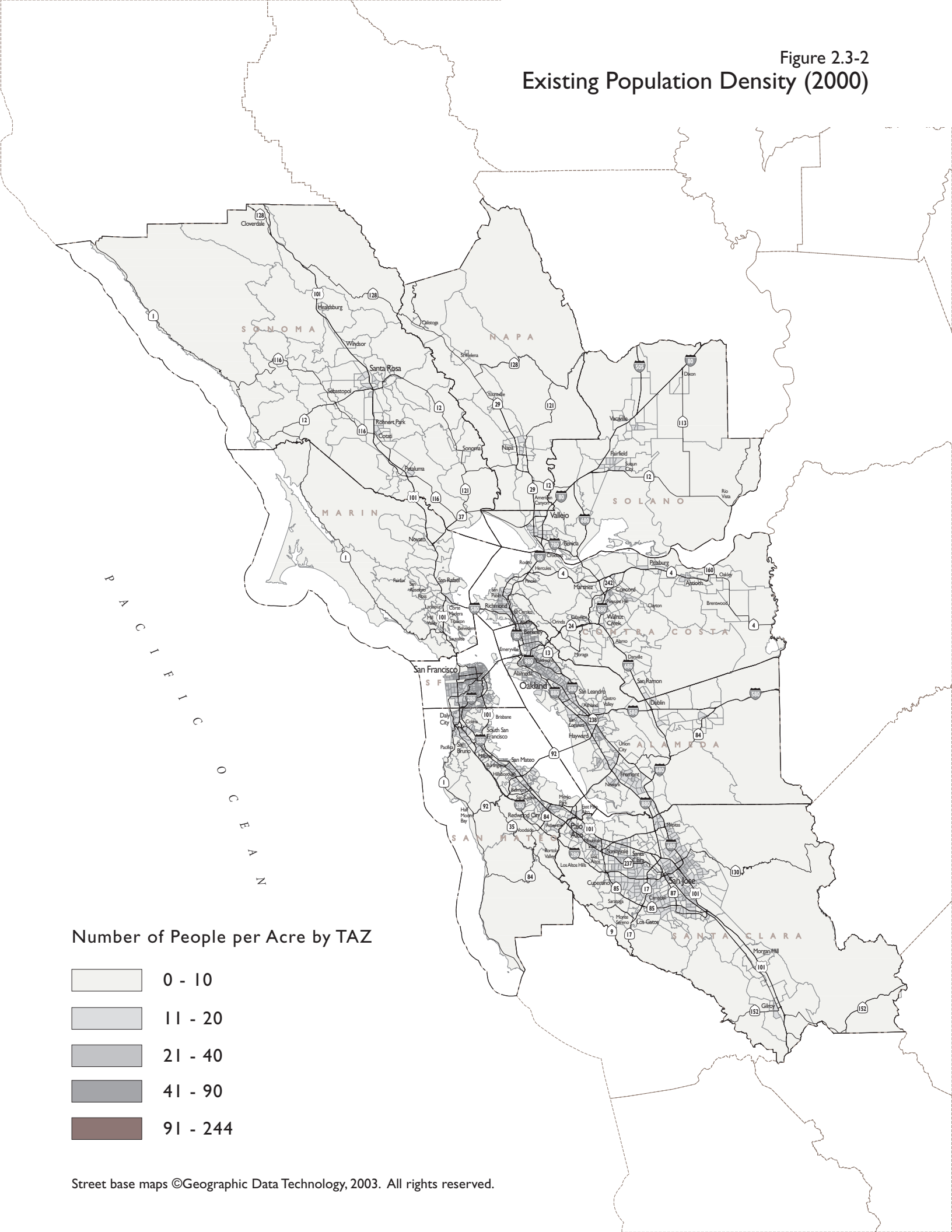
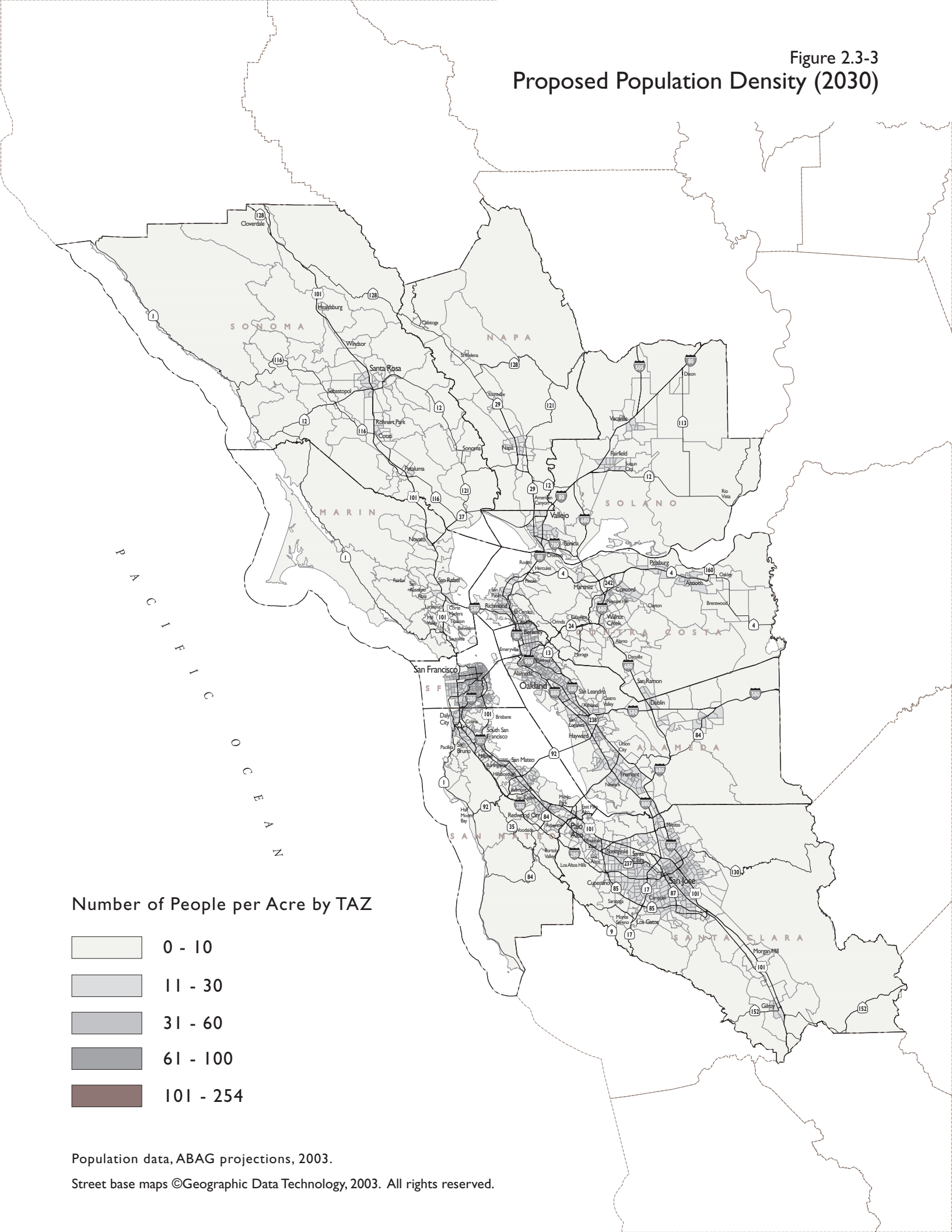


Figure 2.3-3

Proposed Population Density (2030)



Population data, ABAG projections, 2003.

Table 2.3-3: Bay Area Land Use Characteristics

Land Use Characteristics	*1990*	*2000*	*2005*	*2010*	*2020*	*2030*
Population	5,868,700	6,783,762	7,193,904	7,527,536	8,168,310	8,780,317
Households	2,245,900	2,466,015	2,581,347	2,702,069	2,950,936	3,186,592
Residential Acres	448,000	586,892	611,239	634,132	644,217	651,821
Commercial-Industrial Acres	187,200	229,166	229,156	229,371	231,607	235,719
Developed Acres (Residential and Commercial-Industrial)	635,200	816,058	840,395	863,503	875,824	887,540
Total Acres	*4,436,800*	*4,575,251*	*4,575,251*	*4,575,251*	*4,575,251*	*4,575,251*
Population/Residential Acre	*13.1*	*11.6*	*11.8*	*11.9*	*12.7*	*13.5*
Households/Residential Acre	*5.0*	*4.2*	*4.2*	*4.3*	*4.6*	*4.9*
Population/Household	*2.61*	*2.75*	*2.79*	*2.79*	*2.77*	*2.76*
Percentage of Total Acres Developed	*14*	*18*	*18*	*19*	*19*	*19*

Note: information in this table was based on MTC's Superdistrict data.

Source: MTC Superdistrict and County Summaries of ABAG's Projections 2003 2000-2030 Data Summary, 2003

Land Use and Accessibility

Historically, the introduction of new transportation technologies has led to significant changes in the pattern and extent of land use within a region. Early reliance on walking resulted in a pattern of dense cities with dense residential areas surrounding commercial, industrial, and warehousing areas along waterfronts. Later, the introduction of the railroad led to the development of new residential suburbs, which in the Bay Area were situated along the San Mateo and Marin Peninsulas. Streetcar and trolley systems caused the existing dense cities to spread out at a suburban scale as well. Finally, the introduction of the automobile and freeway systems allowed the expansion of residential and commercial development into formerly rural areas and led to the creation of a multi-centered Bay Area.

Land use variables play a key role in influencing the number, distance, duration, and mode of trips, even though the degree of the relationship between land use patterns and trip characteristics is sometimes difficult to quantify. Some key land use variables include residential density, employment density, mixed-use development, jobs-housing balance, location of development relative to transportation systems, availability of parking, and urban design. These factors are summarized below.

- One of the most important variables influencing transit use is residential density. A resident is 30 percent more likely to use transit if he or she lives in a mid-rise or high-rise multifamily neighborhood rather than a single-family neighborhood.[2] In Chicago, for

[2] Transportation Research Board, *TCRP Report 16: Transit and Urban Form* Part 2 (1996) p. 4.

example, doubling residential density doubles transit use. However, for conveniently located housing within 1/4 mile of a transit stop, density matters less than the characteristics of the destination (particularly accessibility to the workplace).

- Average employment density at trip origins and destinations is highly correlated with mode choice for buses, walking and single-occupant vehicle (SOV) use. However, carpool preferences are least sensitive to urban form factors. Employment density thresholds for metropolitan centers need to be at least 75 employees per acre to support transit.[3]

- Mixed-use development helps reduce the total number of generated automobile trips. The Institute of Transportation Engineers (ITE) Trip Generation Manual shows that a 100,000 square-foot office building without mixed uses will generate 18.7 more daily trips than an office building with a mix of commercial and service uses.

- In addition to reducing overall auto trips, land use mix, like jobs-housing balance, shortens average trip length and encourages walking and transit use. People who live in mixed-use blocks are more likely to commute by transit, walking or bicycling, and are less likely to commute by car. However, land-use mix is less influential than density, which accounts for 10 to 20 times more transit ridership than land use mix.[4]

- The location of land uses relative to transportation systems also influences mode choice and trip length. High-intensity commercial uses located in proximity to a highway interchange will allow easy access by automobiles and will therefore encourage automobile travel. Similarly, high-intensity uses in proximity to a transit station will encourage greater transit use.

- Not all uses located near a transit station generate the same amount of transit ridership. In Chicago, for example, a 10 percent increase in the share of station-area land devoted to multi-family housing produces a 20 percent increase in transit ridership, while a 10 percent increase in station-area land devoted to office or institutional uses produces a 30 to 33 percent increase in transit use.[5] This example is not to suggest that office uses will produce greater ridership than housing at all rail stations in all cities, but it simply illustrates the point that different land uses generate different ridership levels.

- The amount of parking at a destination influences whether people will choose to use their automobile. If parking is convenient or readily available, the automobile may be the best means of access. If not, people may choose to change the time of their trip, eliminate the trip, or if possible, substitute a similar, alternative destination. People may also choose to carpool, walk, bike, or take transit.

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[3] Pushkarev, B.S. and J. M. Zupan, "Where Transit Works: Urban Densities for Public Transportation" in *Urban Transportation: Perspectives and Prospects* (1982) p. 343.

[4] Transportation Research Board, *op.cit. 4.*

[5] *ibid.* p. 7.

- Urban design addresses site-specific issues of building placement and orientation, building massing and scale, and pedestrian movement and comfort, all of which influence the propensity to make local walking and biking trips. Urban design principles cannot create walking and bicycle trips alone, but in combination with mixed uses and appropriate densities, strong urban design can support and further encourage additional walking and biking trips. In an adequately dense environment around a transit station, mixed land uses and strong urban design characteristics can reduce automobile trips by 7 percent.[6]

Despite the clear effect that the evolution of new transportation technologies has had on historic land use patterns, the effect of any single project or program of transportation improvements is generally tied to existing land use patterns. And increasingly, housing affordability, lifestyle and educational preferences, and public housing and tax policies, are key factors in land use decisions.

Other reasons why the link between transportation and land changes may be changing are:

- Local general plans, zoning and other land use regulations, as well as local political attitudes sometimes limit the ability and often temper the speed at which developers can initiate market-driven responses to changes in accessibility.

- As the relative cost of transportation has decreased, so too has the role of transportation in location decisions (Cervero, 1986).

- Most importantly, recent changes in accessibility have been too small to change the cost of travel significantly within the urban area.

Finally, in a multi-centered region, any one location is equally accessible to many other locations, which necessarily limits the effect that relative accessibility has on the choice of location. That said, rail transit systems and the potential they offer for transit-supportive development around stations can have an impact on land use with supportive local general plan policies and zoning.

Agricultural Land Use

Current and Historical Agricultural Uses

The Bay Area has a significant amount of land in agricultural uses. In 2002, over half of the region's approximately 4.5 million acres were classified as agricultural land (California Department of Conservation, 2004). Of these 2.4 million acres of agricultural land, over 70 percent (about 1.7 million acres) are used for grazing. Table 2.3-4 shows the acres of agricultural lands, by farmland type, for each county in the region, excluding San Francisco County. Figure 2.3-4 shows the location of these agricultural lands within the region. It is noted that the classification of agricultural lands is based primarily on soils and climate, though Prime Farmland, Farmland of Statewide Importance, and Unique Farmland must have been used for agricultural production at some time during the previous four years.

[6] *ibid.*

Table 2.3-4: Bay Area Agricultural Lands

	Alameda	*Contra Costa*	*Marin*	*Napa*	*San Mateo*	*Santa Clara*	*Solano*	*Sonoma*[1]	*Region*
Prime Farmland[2]	6,328	33,720	8	31,944	2,503	28,816	143,211	37,029	283,559
Farmland of Statewide Importance[3]	1,485	9,735	418	9,735	178	4,244	7,584	18,914	52,293
Unique Farmland[4]	2,100	4,463	254	17,816	2,800	1,404	13,735	30,290	72,862
Farmland of Local Importance[5]	0	52,707	66,428	19,793	3,744	7,711	0	87,634	238,017
Important Farmland Subtotal	9,913	100,625	67,108	79,288	9,225	42,175	164,530	173,867	646,731
Grazing Land [6]	245,728	172,368	90,315	180,109	45,829	388,696	201,338	432,684	1,757,067
Agricultural Land Subtotal	255,641	272,993	157,423	259,397	55,054	430,871	365,868	606,551	2,403,798

[1] Agricultural land use for Sonoma County uses data from year 2000. Data for year 2002 was not available at the time of printing.

[2] Farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields.

[3] Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture.

[4] Farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include nonirrigated orchards or vineyards.

[5] Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee.

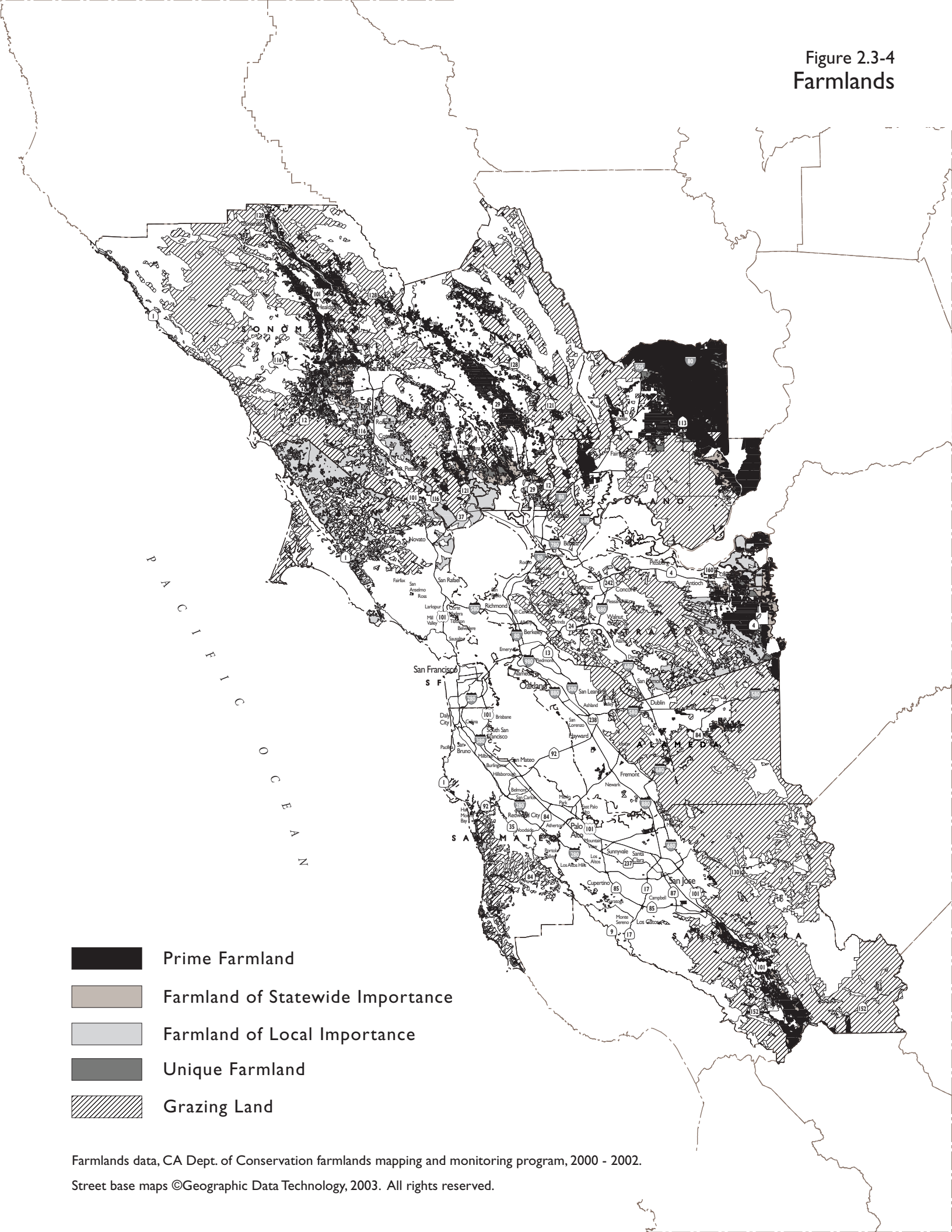
[6] Land on which the existing vegetation is suited to the grazing of livestock.

Source: California Department of Conservation, 2004

Products grown in the Bay Area include field crops, fruit and nut crops, seed crops, vegetable crops and nursery products. Field crops, which include corn, wheat, and oats, as well as pasture lands, represent approximately 87 percent of total farm acreage (County Crop Reports, 2003). The remainder of agricultural land is used to grow crops such as grapes, tomatoes, walnuts, olives, beans, various other fruits and vegetables, and nursery products such as indoor plants, cut flowers, and Christmas trees.

Over the last 50 years, a large amount of agricultural land has been converted to urban uses in the Bay Area. According to the U.S. Census of Agriculture, the region had over 3 million acres of Land in Farms in 1954. By 1997, Land in Farms, which includes pasture lands, decreased by 32 percent to just over 2 million acres (U.S. Department of Agriculture, 1978, 1997). During this same period, Cropland Harvested decreased by 43 percent. Irrigated Land, however, increased by 9 percent, due to a four-fold increase in Napa County, and increases in Solano and Sonoma Counties. Table 2.3-5 shows historical agricultural land data for all the region's nine counties.

Figure 2.3-4
Farmlands



Farmlands data, CA Dept. of Conservation farmlands mapping and monitoring program, 2000 - 2002.

Table 2.3-5: Bay Area Agricultural Lands, 1954 and 1997

	1954			*1997*			*Percent Change 1954-1997*		
	Cropland Harvested	*Land in Farms*	*Irrigated Land in Farms*	*Cropland Harvested*	*Land in farms*	*Irrigated land*	*Cropland Harvested*	*Land in farms*	*Irrigated land*
Alameda	59,548	316,994	22,599	12,628	258,070	10,480	-79%	-19%	-54%
Contra Costa	85,807	324,856	50,117	28,391	147,859	30,416	-67%	-54%	-39%
Marin	12,133	236,956	974	5,776	149,663	777	-52%	-37%	-20%
Napa	52,168	311,907	8,390	50,305	212,401	46,324	-4%	-32%	452%
San Francisco	88	307	n/a	0	21	18	-	-93%	-
San Mateo	24,194	84,247	6,623	6,046	44,588	4,298	-75%	-47%	-35%
Santa Clara	148,056	590,041	114,677	23,172	318,654	18,731	-84%	-46%	-84%
Solano	135,071	423,423	79,971	141,017	362,102	161,621	4%	-14%	102%
Sonoma	98,053	761,832	20,231	80,771	570,804	57,181	-18%	-25%	183%
Total	615,118	3,050,563	303,582	348,106	2,064,162	329,846	-43%	-32%	9%

Source: U.S. Census of Agriculture, 1978, 1997

Williamson Act Lands

In 1965, the State Legislature passed the California Land Conservation Act (better known as the Williamson Act) in response to agricultural property tax burdens resulting from rapid land value appreciation. Rapidly rising property taxes, resulting from nearby urbanization, made agricultural uses increasingly less economically viable. The Act allows local governments to assess agricultural land based on the income-producing value of the property, rather than the "highest and best use" value, which had previously been the rule. The Legislature intended that the Act help farmers by providing property tax relief, and by discouraging the unnecessary and premature conversion of agricultural land to non-agricultural uses (California Department of Conservation, 1986).

Agricultural land under Williamson Act contract includes both "prime" and "nonprime" lands. The California Land Conservation Acts defines prime agricultural land as: 1) USDA Class I or II soils; 2) Storie Index soil rating 80 to 100; 3) land that has returned a predetermined annual gross value for three of the past five years; 4) livestock-supporting land with a carrying capacity of at least one animal unit per acre; or 5) land planted with fruit or nut trees, vines, bushes or crops that have a non-bearing period of less than five years and that will normally return a predetermined annual gross value per acre per year during the commercial bearing period (Government Code Section 51200-51207). Nonprime lands include pasture and grazing lands and other non-irrigated agricultural land with lesser quality soils. It is noted that prime agricultural lands under the Williamson Act are defined differently from Prime Farmland as identified by the California Department of Conservation.

In 2001, land under Williamson Act contract in the Bay Area totaled over 1.2 million acres. Of this total, about 212,000 acres were prime farmland and just over 1 million acres were nonprime

(California Department of Conservation, 2003b). Lands under Williamson Act contract, therefore, are primarily used for pasture and grazing and not for the cultivation of crops. Nearly 70 percent of both prime and nonprime lands under contract are located in Santa Clara, Solano and Sonoma Counties. A total of 55 percent (116,678 acres) of prime lands under contract are located in Solano County. Table 2.3-6 shows the amount of agricultural lands under Williamson Act contract in each of the Bay Area's nine counties.

Table 2-3.6 Williamson Act Lands, 2001

	Prime	*Nonprime*	*Total*	*Percent*
Alameda	10,024	126,806	136,830	11%
Contra Costa	9,053	39,965	49,018	4%
Marin	14,688	78,556	93,244	7%
Napa	17,535	60,532	78,067	6%
San Mateo	2,951	43,882	46,833	4%
Santa Clara	11,414	324,042	335,456	26%
Solano	116,478	148,033	264,511	21%
Sonoma	30,147	254,720	284,867	22%
Bay Area	**212,290**	**1,076,536**	**1,288,826**	**100%**

Source: California Department of Conservation, 2003

Existing And Future Housing Stock

The Bay Area has experienced a 29 percent increase in the number of occupied housing units from 1980 to 2003. (DOF, 2003a and Census, 1980) (Table 2.3-7). In 2003, Santa Clara and Alameda counties had the highest number occupied housing units in the Bay Area with 582,252 and 534,432 units, respectively. Napa County had the lowest number with 47,175 units. Between 2000 and 2030, the number of occupied housing units is expected to increase by 29 percent. Santa Clara and Alameda counties will continue to have the highest proportion of occupied housing units in the region with 24 and 21 percent, respectively, and Napa County the lowest with 2 percent, respectively. According to ABAG *Projections 2003,* the distribution of housing stock across the region's nine counties in 2030 will be roughly equivalent to the distribution in 2000.

The majority of counties saw an increase in the number of persons per household since 1980 with the exception of Alameda, Santa Clara, Solano, and Sonoma counties, which experienced a decrease. According to ABAG *Projections 2003*, in 2000, the average household size in the Bay Area was 2.69 (Table 2.3-8). During this time, Marin and San Mateo counties had the highest household size in the region with 2.92 and 2.90 persons per household respectively, while Alameda County had the lowest with 2.30 persons per household, respectively. Table 2.3-5 shows that household size is expected to peak at 2.73 persons per households between 2005 and 2010 and then decrease slightly before leveling off in 2030 at 2.71 persons per household.

Table 2.3-7: Occupied Housing Units in the Bay Area (1980-2030)

	DOF	Census 1980	ABAG Projections 2003									
County	2003	1980	2000	2005	2010	2015	2020	2025	2030	Growth: 2000-2030	% of Total 2000	% of Total 2030
Alameda	534,432	426,092	523,365	543,394	564,171	587,684	614,099	642,202	675,922	152,557	21	21
Contra Costa	355,686	241,534	344,129	364,911	386,944	408,544	430,045	444,909	459,884	115,755	14	14
Marin	101,969	88,723	100,650	102,689	106,586	109,778	112,108	113,788	115,376	14,726	4	4
Napa	47,175	36,624	45,402	48,441	51,231	53,562	55,571	56,391	57,232	11,830	2	2
San Francisco	338,913	298,956	329,697	336,651	344,359	352,795	363,482	381,831	402,594	72,897	13	13
San Mateo	257,849	225,201	254,104	260,951	267,726	277,985	288,180	296,515	301,012	46,908	10	9
Santa Clara	582,252	458,519	565,862	596,743	629,349	662,072	702,348	733,324	768,045	202,183	23	24
Solano	136,227	80,426	130,403	143,176	155,418	169,230	178,202	186,451	193,370	62,967	5	6
Sonoma	178,085	114,474	172,403	184,391	196,285	202,356	206,901	210,001	213,157	40,754	7	7
Region	***2,532,588***	***1,970,549***	***2,466,015***	***2,581,347***	***2,702,069***	***2,824,006***	***2,950,936***	***3,065,412***	***3,186,592***	***720,577***	***100***	***100***

Note: information in this table was based on MTC's Superdistrict data.

Source: DOF, 2003a; Census, 1980; MTC Superdistrict and County Summaries of ABAG's Projections 2003 2000-2030 Data Summary, 2003

Table 2.3-8: Average Household Size in the Bay Area (1980-2030)

	DOF	*Census*	*ABAG Projections 2003*						
County	*2003*	*1980*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*	*2030*
Alameda	2.64	2.55	2.71	2.77	2.77	2.76	2.75	2.75	2.75
Contra Costa	2.28	2.19	2.72	2.75	2.74	2.74	2.73	2.71	2.71
Marin	2.59	2.56	2.34	2.37	2.37	2.36	2.35	2.35	2.35
Napa	2.92	2.76	2.62	2.63	2.63	2.61	2.59	2.58	2.58
San Francisco	2.75	2.53	2.30	2.31	2.30	2.28	2.27	2.27	2.27
San Mateo	2.77	2.69	2.74	2.77	2.78	2.78	2.78	2.77	2.77
Santa Clara	2.35	2.43	2.92	2.94	2.95	2.94	2.93	2.92	2.92
Solano	2.74	2.58	2.90	2.96	2.95	2.93	2.92	2.90	2.90
Sonoma	2.90	2.82	2.60	2.64	2.62	2.61	2.61	2.60	2.60
Region			***2.69***	***2.73***	***2.73***	***2.72***	***2.72***	***2.71***	***2.71***

Note: information in this table was based on MTC's Superdistrict data.

Source: DOF, 2003a; Census, 1980; MTC Superdistrict and County Summaries of ABAG's Projections 2003 2000-2030 Data Summary, 2003

REGULATORY SETTING

The regulatory setting includes federal and State agencies and laws, local regulatory bodies, and local control mechanisms guiding land use and transportation decisions.

Federal Regulations

U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)

The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) maps soils and farmland uses to provide comprehensive information necessary for understanding, managing, conserving and sustaining the nation's limited soil resources. In addition to many other natural resource conservation programs, the NRCS manages the Farmland Protection Program, which provides funds to help purchase development rights to keep productive farmland in agricultural uses. Working through existing programs, USDA joins with state, tribal, or local governments to acquire conservation easements or other interests from landowners.

Department of Housing and Urban Development (HUD)

The Department of Housing and Urban Development (HUD) is the federal agency responsible for national policy and programs that address housing needs in the U.S. HUD aims to improve and develop the Nation's communities and enforce fair housing laws. HUD plays a major role in supporting homeownership by underwriting homeownership for lower- and moderate-income families through its mortgage insurance programs.

State Regulations

Bay Conservation and Development Commission (BCDC)

The Bay Conservation and Development Commission is one of California's two designated coastal management agencies that administer the federal Coastal Zone Management Act (CZMA) in California. CZMA gives State coastal management agencies regulatory control over all activities that may affect coastal resources including any new development, and highway improvement projects that use federal funds.

Department of Housing and Community Development (HCD)

In response to state population and household growth, and to ensure the availability of affordable housing for all income groups, the State Department of Housing and Community Development (HCD) is responsible for determining the regional housing need for all jurisdictions in California.

Regional/Local Regulations

Association of Bay Area Governments (ABAG)

Through its role as the Bay Area's council of governments (COG), the Association of Bay Area Governments (ABAG) has been designated by the State and federal governments as the official comprehensive planning agency for the Bay Area. ABAG reviews projects of regional significance for consistency with regional plans and is also responsible for preparation of the Regional Housing Needs Assessment (RHNA), pursuant to California Government Code Section 65584(a). ABAG's locally adopted *Regional Housing Needs Determination Allocation* (2001-2006) report published March 15, 2001, provides a policy guide for planning the region's housing, economic development, environmental quality, transportation, recreation, and health and safety.

Local Agency Formation Commissions

Under State law, each county must have a local agency formation commission (LAFCO), which is the agency that has the responsibility to create orderly local government boundaries, with the goal of encouraging "planned, well-ordered, efficient urban development patterns," the preservation of open space lands, and the discouragement of urban sprawl (Governor's Office of Planning and Research, 1997). While LAFCOs have no land use power, their actions determine which local government will be responsible for planning new areas. LAFCOs address a wide range of boundary actions, including creation of spheres of influences for cities, adjustments to boundaries of special districts, annexations, incorporations, detachments of areas from cities, and dissolutions of cities.

Local Control Mechanisms

General Plans

The most comprehensive land use planning for the San Francisco Bay Area region is provided by city and county general plans, which local governments are required by State law to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or which the jurisdiction has chosen to include. Required topics are: land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address are: public facilities, parks and recreation, community design, or growth management. City and county general plans must be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas).

Specific and Master Plans

A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These more localized plans provide for focused guidance for developing a specific area, with development standards tailored to the area, as well as systematic implementation of the general plan.

Zoning

The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, State law has required the city or county zoning code to be consistent with the jurisdiction's general plan.

Growth Control

Local growth control endeavors to manage community growth by various methods, including tying development to infrastructure capacity or traffic level of service standards, limiting the number of new housing units, setting limits on the increase of commercial square footage, linking development to a jobs/housing balance, and the adoption of urban growth boundaries. These goals and others can be achieved through the adoption of a countywide Growth Management Program (GMP). Growth Management programs, including urban growth boundaries, have been implemented by County government and/or cities in all of the nine Bay Area counties.

Public Ownership, Purchase of Development Rights, and Open Space Acquisition

Local governments and special districts, either on their own or working with land trusts and conservancies, can acquire fee title to agricultural and open space lands or purchase development rights to preserve rural and agricultural areas, watersheds, or critical habitat, or to create public parks and recreational areas. Such actions have been undertaken in all Bay Area counties and have had significant effects on the shape of cities and urban form in the region.

IMPACT ANALYSIS

The land use impact analysis assesses the potential for significant adverse impacts related to conversion or loss of important agricultural lands and open space; community displacement and disruptions, including potential loss of housing and businesses and separation of people from community resources; project consistency with adopted land use plans; and project influences on future land use and development decisions (based on changes to access and mobility).

SIGNIFICANCE CRITERIA

The land use analysis uses the following significance criteria.

- **Criterion 1: Converts farmland to transportation use.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant impact when transportation projects convert substantial amounts of important agricultural lands and open space for the development of transportation facilities. Such conversion from natural resource use would be significant whether or not the proposed facility is consistent with local or regional plans.

- **Criterion 2: Causes residential, business, or urban open space land use disruption or displacement.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant impact if new construction and/or right-of-way acquisition associated with the transportation projects result in residential or business disruption or displacement.

- **Criterion 3: Causes permanent community disruption.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant impact if transportation projects result in permanent alterations to the characteristics and qualities of an existing neighborhood or community by separating residences from community facilities and services, restricting access to commercial or residential areas, or eliminating community amenities.

- **Criterion 4: Conflicts with local plans.** Implementation of the proposed Transportation 2030 Plan would have a potentially significant impact if transportation projects substantially conflict with the land use portion of adopted local general plans or other applicable land use plans. Also, a potentially significant impact would be identified if transportation projects would substantially influence future land use patterns and development, contrary to adopted plans.

METHOD OF ANALYSIS

The degree of land use impact will vary among the proposed transportation improvements. The land use analysis goes beyond a simple listing of projects that could have potential impacts (over 150 projects in all) and quantifies impacts by corridor to provide an understanding of: 1) the general amount and type of land that might be impacted; and 2) where impacts may be concentrated. Because there are no details about land requirements for the various projects, the analysis necessarily makes general assumptions about the amount of land needed to implement the proposed projects. As a result, the analysis presents a worst-case scenario of land use impacts, and the acreages in the analysis should be used as a guide in assessing relative impacts, rather than as absolute statements of impacts. Site-specific analysis will be required when individual projects are considered for approval.

Farmlands. This EIR identifies the factors affecting development impacts in specific corridors and determines whether any of the Transportation 2030 projects may affect the relative ability of local jurisdictions to protect agriculture and open space. To conduct the farmland analysis, 178 of the 912 projects in the proposed Transportation 2030 Plan were identified as projects with potential physical impacts. The 178 projects were then studied using Geographic Information Systems (GIS)and compared with the farmland maps referenced in the Environmental Setting (above) to determine the extent of the physical impacts of the proposed Transportation 2030 Plan projects on important agricultural or permanent open space lands.

Land Use Disruptions/Displacement. The impact analysis includes investigation of potential direct impacts due to physical disruptions of existing neighborhoods, including displacement of residents and businesses, as a result of implementation of proposed transportation improvements. The analysis is presented at the corridor level and involves assumptions based on

limited information where the underlying transportation projects are in the early planning phases. The assessment identifies Transportation 2030 Plan projects that may involve major right-of-way acquisition and generally identify locations where the right-of-way acquisition could result in the displacement of existing homes and businesses. This analysis is necessarily limited because it must, for the most part, be based on assumptions on how future projects will be designed, rather than on actual project designs.

Additionally, the EIR analyzes the potential for community disruption by reviewing the location of Transportation 2030 Plan projects in relation to surrounding land uses and community development. Highway and transit extensions and major interchange projects are assumed to have a higher potential to disrupt or divide existing communities, while highway widening and other projects along established transportation rights-of-way are assumed to have a lower potential to divide or disrupt existing communities or neighborhoods.

The projects with potential physical impacts were studied using Geographic Information Systems (GIS) and compared with year 2000 ABAG land use maps (which included protected open space) to ascertain whether land uses such as neighborhoods, housing, and businesses would be displaced or disrupted.

Consistency with Land Use Plans. The land use analysis identifies potential conflicts or inconsistencies between the proposed Transportation 2030 Plan and adopted land use policies of the various jurisdictions within the study area. The analysis identifies Transportation 2030 projects that intersect with airport areas.

SUMMARY OF IMPACTS

Direct Impacts

Implementation of the transportation improvements in the proposed Transportation 2030 Plan could result in loss of agricultural land, long term land use impacts and short term disruptions, including residential and business displacements, as a result of the construction of highway and transit projects proposed in the Plan.

Conversion of Farmland

Overall, there are 59 projects in the proposed Transportation 2030 Plan in 10 corridors with the potential to impact 3,430 acres of farmland, assuming the worst case disturbance.

Land Use and Community Disruption/Displacement

There are 151 projects in the proposed Transportation 2030 Plan in 12 corridors with the potential to impact existing land uses within communities. These projects could cause short term community disruption in locations where transportation improvements involve significant construction activity. The duration of impact on adjacent and nearby land uses could vary from several months to several years.

Some of these same projects could also result in significant and permanent disruption of existing communities; however, the potential for such disruption is minimized as a result of MTC's criteria used to evaluate potential Plan projects. These criteria specifically address community vitality and the relation to a community's development and/or redevelopment activities. The large freeway, expressway and rail transit projects in the Plan all involve widenings or other capacity increases along existing transportation corridors; they would not split or bisect established communities that share historical links.

Some of the projects are intended to enhance the quality of life in existing communities and neighborhoods. Other projects would involve redevelopment with the potential to adversely affect existing neighborhoods adjacent to the sites while at the same time having the potential to create new residential communities within the existing urban fabric.

Consistency with Local Plans

The proposed transportation improvements in the Transportation 2030 Plan effectively do not conflict with the land use designations of current local general plans.

Other Direct Impacts

The implementation of some transportation improvements in the proposed Transportation 2030 Plan could adversely affect adjoining land. Impacts could include increased noise, disturbance of cultural resources, loss or modifications to significant natural habitats, etc. While these impacts can affect the compatibility of the proposed transportation improvements with adjoining uses, these impacts are addressed in the related chapters of Part Two of this EIR.

Indirect/Cumulative Impacts

Concurrent implementation of the proposed Transportation 2030 Plan and forecast development of residential and employment land uses would result in expansion of urban areas and changes in land use and the character of neighborhoods and districts in the Bay Area.

IMPACTS AND MITIGATION MEASURES

Impact

2.3-1 Implementation of the proposed Transportation 2030 Plan could convert farmland, including prime agricultural land designated by the State of California, to transportation use. ***(Significant)***

Overall, there are 59 projects in the proposed Transportation 2030 Plan in 10 corridors with the potential to impact 3,430 acres of farmland, assuming the worst case disturbance.[7] Of that total, nearly half is grazing land, 24 percent is prime farmland, and the remaining quarter is made up of

[7] The acreage calculation is based on a 100 ft. buffer on either side of the centerline of a linear project (the existing road width was then subtracted out for road widening projects) and a 100 ft. radius around the center of a point project.

Farmland of Local & Statewide Importance and Unique Farmland, as documented in Table 2.3-9.[8] Of those 59 projects, 9 are new roads, most (38) are road widening projects, and the remaining 12 are extensions, intersections, or other types of physical improvement projects, like parking lots or transit terminals, as illustrated in Table 2.3-10.

Table 2.3-9: Type of Farmland Potentially Affected by Proposed Project

Type	*Acres*	*Percent*
Farmland of Local Importance	651	19%
Farmland of Statewide Importance	167	5%
Grazing Land	1,674	49%
Prime Farmland	840	24%
Unique Farmland	97	3%
Total Farmland	**3,430**	**100%**

Source: MTC; Dyett & Bhatia, 2004

Table 2.3-10: Types of Projects Potentially Affecting Agricultural Land

	Type of Project					
Corridor	*Extension*	*Intersection*	*New*	*Other*	*Widening*	***Total***
Delta			1		4	5
Diablo			1	1	2	4
Eastshore-North			3		2	5
Fremont-South	1				3	4
Golden Gate	1	1	1	1	7	11
North Bay East-West		1	2		3	6
Peninsula	2				1	3
Silicon Valley	3				11	14
Sunol Gateway				1	2	3
Tri-Valley			1		3	4
Total	7	2	9	3	38	**59**

Source: MTC; Dyett & Bhatia, 2004

[8] The farmland acre totals include land not currently in production. In some cases, these farmlands may be zoned for urban development.

Table 2.3-11: Farmland Acres Potentially Affected by Proposed Project

	Type of Farmland					
Corridor	*Farmland of Local Importance*	*Farmland of Statewide Importance*	*Grazing Land*	*Prime Farmland*	*Unique Farmland*	***Total***
Delta	126	28	49	66	1	270
Diablo	5		39			44
Eastshore-North		21	181	209	28	440
Fremont-South		3	175	77	11	265
Golden Gate	350	54	163	174	41	782
North Bay East-West	134	11	130	27	2	303
Peninsula	6			4	5	15
Silicon Valley	32	44	454	297	5	832
Sunol Gateway		1	455	43	17	516
Tri-Valley		8	195	8	2	213

Source: MTC; Dyett & Bhatia, 2004

The 10 corridors containing farmland potentially affected by Transportation 2030 Plan projects are shown in Table 2.3-11. The Silicon Valley and Golden Gate Corridors are the most impacted, with 832 and 782 acres of potentially threatened farmland, respectively. In Silicon Valley, more than half of the impacted acres are grazing land. In Golden Gate, however, nearly 80 percent of the affected land is either Prime or Unique Farmland or Farmland of Local or Statewide Importance. Of the six corridors with 270 or more affected acres, all but the Silicon Valley are protected by one or more Urban Growth Boundaries (UGB) or Countywide Land Use Measures, as described in Table 2.3-12. This means that if the land falls outside the UGB, there are already regulatory measures in place to aid local jurisdictions in farmland protection. The Diablo and Peninsula Corridors are the least affected, with only 44 and 15 acres of concern.

The likelihood of conversion increases where transportation improvements are located at the edges of existing urban areas, along waterways, or over hills separating urban areas. The extent of this impact will depend on the final design of the identified projects and on the project-specific analysis require by CEQA to determine the importance of the endangered resource land.

Given the predominant location of most projects within developed areas, and the fact that most projects happen within existing corridors, the conversion of resource land is likely to be limited. Many municipalities have already planned for the conversion of farmlands to urban uses, especially where it is used for grazing (which is not an endangered agricultural activity) rather than agricultural production. Thus, on a regional level the conversion of farmland to transportation uses would likely not be significant; however, some conversion could be significant on a local level.

Table 2.3-12: Urban Growth Boundaries and County-wide Land Use Measures

Corridor	*Delta*	*Eastshore-North*	*Golden Gate*	*North Bay East-West*	*Silicon Valley*	*Sunol Gateway*
County-wide Measure	Contra Costa	Solano	Marin	Solano, Napa		Alameda
Urban Growth Boundary		Benicia, Dublin Hills	Healdsburg, Windsor, Santa Rosa, Rohnert Park, Cotati, Petaluma, Novato	City of Sonoma, City of Napa		Dublin Hills, Pleasanton, Palo Alto

Source: Greenbelt Alliance, 2004

Mitigation

2.3(a) Project sponsors shall commit to mitigation measures at the time of certification of their project environmental document that would minimize or eliminate conversion of farmland. Typical mitigation measures that could be considered by project sponsors include:

- Corridor realignment, where feasible, to avoid farmland, especially prime agricultural land;
- Buffer zones and setbacks to protect the function of farmland; and
- Berms and fencing to reduce conflicts between transportation and farming uses.

These measures are not expected to reduce this impact to less-than-significant in all cases. The extent of this impact will depend on the final design of each transportation improvement and on the project-specific analysis require by CEQA to determine the importance of the farmland to be converted.

Impact

2.3-2 Implementation of the Proposed Transportation 2030 Plan could disrupt or displace existing land uses, neighborhoods, and communities in the short term. ***(Significant)***

The proposed transportation improvements in the Transportation 2030 Plan could result in short term community disruption where such improvements involve significant construction activity. The significance of the disruption will depend upon the size and extent of the improvement, the nature of the disruption, and the duration of construction. While construction activities are typically limited in duration, work on major transportation improvements such as rail transit extensions, freeway widening projects and interchange reconstructions, often span a period of several years because the projects are large and complex and/or because the construction contractors are required to keep traffic flowing on existing lanes passing through the construction sites. As a result, the construction of major transportation improvements can result in frequent

inconveniences and irritations for residents of communities immediately adjacent to the construction sites over a period of many months.

Table 2.3-13: Type and Amount of Land Use Potentially Disrupted by Proposed Project

Land Use	*Acres*
Employment Areas	2,564
Residential	2,419
Urban Open Space	857
Total	**5,840**

Source: MTC; Dyett & Bhatia, 2004

There are 151 projects in the proposed Transportation 2030 Plan in 12 corridors with the potential to impact 5,840 acres of existing land uses, assuming the worst case disturbance. Of that total, 44 percent is commercial use, another 41 percent is residential use, and the remaining 15 percent is urban open space, as documented in Table 2.3-13. Of those 151 projects, most (97) are widening projects, 20 are extensions, 13 are new roads, and the remaining 21 are intersections or other types of physical improvement projects, like parking lots or transit terminals, as illustrated in Table 2.3-14. These projects could cause temporary disruptions of homes, businesses, and urban open space.

Table 2.3-14: Types of Projects Potentially Disrupting Existing Land Use

	Type of Project					
Corridor	*Extension*	*Intersection*	*New*	*Other*	*Widening*	***Total***
Delta		1	1		3	5
Diablo	2		1	1	3	7
Eastshore-North			3	2	5	10
Eastshore-South	3		2		3	8
Fremont-South	3			2	4	9
Golden Gate*	1	2	1	1	9	14
Napa Valley					1	1
North Bay East-West		1	1		4	6
Peninsula	4	3		3	12	22
Silicon Valley	7	4	4		47	62
Sunol Gateway				1	2	3
Tri-Valley					4	4
Total	20	11	13	10	97	**151**

Source: MTC; Dyett & Bhatia, 2004

The 12 corridors containing existing land uses potentially affected by Transportation 2030 Plan projects are shown in Table 2.3-15. The Silicon Valley and Golden Gate corridors are the most impacted, with 1,062 and 1,362 acres of threatened land use, respectively. In the Golden Gate corridor, more of the potential disruption occurs in commercial areas, while in the Silicon Valley corridor, the disruption is more equally divided between commercial and residential uses; only nine percent is urban open space. The Napa Valley corridor has minimal concern of displacement, with only six threatened acres. Projects in four other corridors—Delta, Diablo, Eastshore-North, and Eastshore-South—have less of a potential impact, with less than 250 acres of concern in each corridor.

Table 2.3-15: Existing Land Use Acres by Corridor Affected by Proposed Project

	Land Use			
Corridor	*Employment Areas*	*Residential*	*Urban Open Space*	***Total***
Delta	27	60	51	138
Diablo	52	128	46	226
Eastshore-North	79	105	62	246
Eastshore-South	83	83	9	176
Fremont-South	382	313	144	839
Golden Gate	684	544	135	1,362
Napa Valley	1	1	1	3
North Bay East-West	96	145	135	504
Peninsula	377	247	45	669
Silicon Valley	505	466	91	1,062
Sunol Gateway	308	325	173	806
Tri-Valley	55	92	50	197

Source: MTC; Dyett & Bhatia, 2004

Mitigation

2.3(b) Project sponsors shall commit to site-specific mitigation measures at the time of certification of their project environmental document that would minimize or eliminate short term (often construction-related) disruption or displacement of existing land uses, specifically residential, commercial, or urban open space. Typical mitigation measures that could be considered by project sponsors include:

- Berms and fencing to reduce conflicts between transportation and existing uses.
- Regulate construction operations on existing facilities to minimize traffic disruptions and detours, and to maintain safe traffic operations;
- Ensure construction operations are limited to regular business hours where feasible;
- Control construction dust and noise; and,

- Control erosion and sediment transport in stormwater runoff from construction sites.

These measures are not expected to reduce this impact to a less-than-significant level in all cases. The extent of this impact will depend on the final design of each transportation improvement and the phasing of implementation.

Impact

2.3-3 Transportation improvements in the proposed Transportation 2030 Plan have the potential to cause permanent community disruption. ***(Significant, mitigable)***

Several improvements in the proposed Transportation 2030 Plan could result in significant and permanent disruption of existing communities; residential, commercial, and open space land could be lost as a result of transportation improvements. However, the potential for such disruption is minimized as a result of MTC's Resolution 3564 performance criteria used to evaluate candidate projects to be included in the plan, which specifically address community vitality and the relation to a community's development and/or redevelopment activities. As a result, proposed transportation improvements with the highest risk of disturbing the fabric and character of existing neighborhoods were rejected or modified at the local level well before they were proposed for inclusion in the RTP. Historically, transportation improvements with the highest risk of community disruption include new freeways, expressways, or rail lines on alignments that pass through existing urban areas and pockets of development in rural areas. Few, if any, of the specific projects in the proposed Transportation 2030 Plan fit this historical mold. The large freeway, expressway and rail transit projects in the Plan all involve widening or other capacity increases along existing transportation corridors; they would not split or bisect established communities that share historical links.

Some projects in the proposed Transportation 2030 Plan would expand interconnections between neighborhoods and communities that are currently separated by major transportation corridors. Examples include bridges or undercrossings (with bike lanes) of commuter rail lines, bicycle/pedestrian overcrossings of freeways, and urban trail and pathway projects.

Local governments have initiated projects in the proposed Transportation 2030 Plan with the intention of enhancing the quality of life in existing communities and neighborhoods. Examples include new facilities to carry traffic around downtown commercial districts in Livermore and Brentwood, traffic calming projects in many communities, and bicycle and pedestrian projects throughout the region.

The proposed Transportation 2030 Plan would also provide funding assistance for several Transit Villages and transit-oriented development projects in the vicinity of some BART stations, and other Smart Growth initiatives that could involve the redevelopment of existing urban sites with higher density development and support for transportation improvements for infill development. These projects have the potential to adversely affect existing neighborhoods adjacent to the sites because of increased local traffic, safety and security concerns, sunlight and view blockage and privacy effects, while at the same time they have the potential to create new residential communities within the existing urban fabric. In all cases, local planning approvals will be

required for such land development and local traffic impacts and other physical effects would be studied if there were a potential for significant impacts.

Mitigation

2.3(c) Project sponsors shall commit to site-specific mitigation measures at the time of certification of their project environmental document. Mitigation measures will be identified to the extent feasible to minimize impacts. Typical measures include:

- Berms and fencing to reduce conflicts between transportation and existing uses;
- Corridor realignment, where feasible, to avoid land use disruption; and
- Buffer zones and setbacks to protect the continuity of land uses.

2.3(d) MTC should encourage project sponsors through EIR comments to consider design elements in their projects that would maintain or enhance neighborhood accessibility.

2.3(e) MTC shall continue to support locally sponsored traffic calming and alternative transportation initiatives such as paths, trails, overcrossings, and bicycle plans that foster improved neighborhoods and community connections.

Project-specific mitigation measures combined with affirmative efforts to foster local-scale alternative transportation initiatives would be expected to reduce this potentially significant effect on community disruption to a less-than-significant level if incorporated by project sponsors.

2.3-4 Implementation of the proposed Transportation 2030 Plan may conflict with existing local General Plans. ***(Not significant)***

The interagency screening and evaluation process for all locally-sponsored transportation improvements is built upon a foundation of local general plans. The proposed transportation improvements in the Transportation 2030 Plan originate from the Congestion Management Programs of each county, the Countywide Transportation Plans for a number of counties, and the service plans for a number of transit agencies. These plans and programs have been developed to consider the current needs and future demands identified in local general plans and supporting studies including local traffic management plans, capital improvement programs (CIPs), transit-supportive development plans, streetscape and pedestrian improvements, and bicycle plans.

While transportation improvements on State and Interstate highways and those sponsored by special districts – such as BART, AC Transit, SAMTRANS, Golden Gate Transportation District, etc. – are not necessarily derived from local general plans, they are reviewed for consistency with such plans through the congestion management program update process, RTP screening and funding, and environmental review processes. As a result, the proposed transportation improvements in the Transportation 2030 Plan effectively do not conflict with the land use designations of current local general plans. Where the potential for a conflict was perceived during the planning process, such as in the Contra Costa East County Corridors, with completion of capacity and safety improvements to Vasco Road, the SR 4 Bypass, Byron Highway and

existing Route 4 through Brentwood, Oakley and unincorporated areas, the draft Contra Costa Transportation Plan was amended to require an assessment of their potential for inducing additional development that might conflict with the County General Plan and rural land preservation policies and identification of measures to minimize or prevent such inducement. Project-specific mitigation is to include consideration of purchase of abutters' rights of access, preservation of critical habitat and/or open space acquisition.

The proposed Transportation 2030 Plan has a long implementation period, and the financial resources available to MTC may not be sufficient to implement all the projects in the Plan within the 25 year planning period. Moreover local jurisdictions, countywide agencies and MTC may differ on the priority given to specific projects. The resulting priority setting process necessarily adds uncertainty to the timing and level of funding for many projects that have been assumed in adopted General Plans. This has implications for planned development since cities and developers – both responding in part to the marketplace but also to residents' concerns and local fiscal constraints – may postpone or alter development projects in response to the deferment of necessary transportation improvements.

Table 2.3-16 shows the 15 Transportation 2030 projects of significance that fall within one mile of Oakland, San Francisco, or San Jose's airports. The projects must comply with the airports' master plans before they are implemented.

ABAG's Projections 2003, which is used in this EIR, was developed based on local input gathered through the Local Policy Survey conducted by ABAG and the Smart Growth Project. These forecasts may not be entirely consistent with existing local general plans since the policy-based Projections 2003 relies on proactive economic assumptions about land use policies based on smart growth principles. Notably, a recent survey of local jurisdictions conducted by ABAG suggests that there is widespread support for including smart growth measures in their land use policies and decisions. The issue of Projections 2003 consistency with local planning is further addressed in Chapter 3.1.

Cumulative Impact

2.3-5 Concurrent implementation of the proposed Transportation 2030 Plan and forecast development of residential and employment land uses would result in expansion of urban areas and changes in land use and the character of neighborhoods and districts in the Bay Area. ***(Significant, unavoidable)***

The proposed Transportation 2030 Plan will be implemented concurrently with substantial residential, commercial, and industrial development in the Bay Area over the next 25 years. ABAG's Projections 2003 estimate that 1,996,555 new residents and about 1,472,610 new jobs will be added during this time period. This growth will require the conversion or redevelopment of considerable land areas in the region. ABAG estimates that about 71,482 acres will be converted to accommodate this planned growth. This development represents conversion of approximately one percent of the land in the Bay Area to urban uses over the next 25 years. Besides the land converted to urban uses, currently urbanized land will be intensified with infill development.

Table 2.3-16: Projects that Intersect with Airport Planning Areas

Project ID	*Airport*	*Corridor*	*Investment **	*Description*
22084	OAK	Alameda County	N	New connection to Oakland International Airport North Field connects State Rte. 61 with Earhart Rd
21185	OAK	Eastshore-South	N	Extends the existing 2-lane Eden Road west approximately 1500 feet from Doolittle Drive to adjacent to the City of San Leandro's Water Pollution Control Plant.
22670	OAK	Eastshore-South	V	Constructs HOV lanes on I-880: NB from Hacienda overcrossing to 98th Avenue, and SB from 98th Avenue to Marina Blvd.
21610	SFO	Peninsula	V	US 101 auxiliary lanes from San Bruno Avenue to Grand Avenue
22720	SFO	Peninsula	N	Consists of design work, studies and preservation of right of way for planned grade separation projects as well as construction work in San Mateo County.
22741	SFO/SJC	Peninsula	V	Implements Phase II of Baby Bullet, which will include additional tracks, station, signal and bridge work to increase capacity and operational flexibility.
22800	SJC	Fremont-South	V	Completes Final Design, Civil Construction, Systems Installation, Vehicle Procurement for 16.3 mile extn of BART into Santa Clara Co from Warm Springs, through Milpitas to downtown San Jose, continuing to the Santa Clara Caltrain Sta
21724	SJC	Silicon Valley	N	Auxiliary lanes NB and SB on US 101 between Trimble Rd and Montague Expway.
21744	SJC	Silicon Valley	N	Constructs a bicycle/pedestrian overcrossing at the Caltrain RR tracks to provide access to Brokaw Road and the San Jose Airport.
22147	SJC	Silicon Valley	V	Constructs a new interchange connecting Zanker Rd and Old Bayshore Hwy with N Fourth St and Skyport Dr at US 101.
22169	SJC	Silicon Valley	N	Widens Coleman Ave to 6 lanes from Hedding St and a future Autumn St extn.
22171	SJC	Silicon Valley	N	Extends Autumn St to Coleman Ave with connector from I-880.
22979	SJC	Silicon Valley	N	Constructs a new interchange connecting Zanker Rd and Old Bayshore Hwy with N Fourth St and Skyport Dr at US 101. (Phase 1)
22983	SJC	Silicon Valley	V	Constructs a new interchange connecting Zanker Rd and Old Bayshore Hwy with N Fourth St and Skyport Dr at US 101. (Phase 2)
98139	SJC	Sunol Gateway	N	Improves the ACE Rte between San Joaquin Co and Santa Clara Co, including parking at stations.

**C:Committed; N: New Commitment; V: Vision Element*

Source: MTC; Dyett & Bhatia, 2004

Table 2.3-17: Change in Highway Supply, 2030 vs. 2000

	Percent Change in Lane Miles Per Capita
Freeways	92.25%
Mixed Flow	83.13%
HOV	231.78%
Expressways	87.09%
Mixed Flow	86.18%
HOV	104.07%
Arterial//Other	79.87%
Total	**83.02%**

Source: MTC

Table 2.3-18: Change in Transit Supply: 2030 vs. 2000

	Percent Change In A.M. Passenger Seat Miles Per Capita
Bus	108.91%
Light Rail	108.30%
Rail Rapid	146.98%
Commuter Rail	80.17%
Ferry	137.02%
Total	**115.87%**

Source: MTC

Mitigation

MTC has no land use authority and cannot directly affect the pattern that future land uses will take. However, it can strive to implement the following measure.

2.3(f) MTC shall continue to participate in and promote the efforts of the Regional Agencies Smart Growth Initiative, which is intended to coordinate regional smart growth efforts to use land more efficiently, optimize transportation and other infrastructure investments, preserve open space, etc. In this way, MTC can pursue the enhanced coordination of local land use plans and investments in the proposed Transportation 2030 Plan.

Because of MTC's limited role in land use planning, this measure is not expected to reduce this impact to a less-than-significant level.

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